Food security in the Russian Federation

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153

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David Sedik
Economist
FAO Regional Office for Europe
Sergey Sotnikov
Research Fellow
Economics Department
Iowa State University, Ames, Iowa
United States of America
and
Doris Wiesmann
Research Fellow
Center for Development Research
University of Bonn
Germany

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Foreword and acknowledgements

In the past 11 years the transition countries of the Commonwealth of Independent States have experienced the most rapid increase in poverty of any region in the world (World Bank, 2000). The Russian Federation itself experienced a decrease in GDP per capita of nearly 50 percent between 1990 and 1998. After the sudden fall in value of the rouble in the fall of 1998, there was great concern over food insecurity in the Russian Federation. In 1998, as a humanitarian response to transition difficulties, the United States and European Union governments announced food aid packages valued at over $1.5 billion for the country.

Despite great concern over Russian food insecurity both within the Russian Federation and abroad, the dimensions and character of food insecurity in the country have not been studied in a systematic manner. Part of the reason for this is the lack of representative survey material on the topic. But a more profound reason was a lack of awareness in the Russian Federation of exactly how "food security" is commonly understood by humanitarian donors. For this reason, the United Kingdom Department for International Development (DFID) requested the Food and Agriculture Organization of the United Nations (FAO) to design and manage a capacity-building technical assistance project in the Russian Federation, *Food security assessment in the Russian Federation*. Helping to build a world without hunger is one of the main mandates of FAO.

This report is the main output of the project *Food security assessment in the Russian Federation*, building on a literature survey, technical background papers and survey work during the period June 2000 to November 2001. The report was prepared by David Sedik (FAO), Sergei Sotnikov (Iowa State University) and Doris Wiesmann (Centre for Development Research, University of Bonn). The report benefited from extensive reviews within FAO from William Meyers (Agricultural and Development Economics Division), Marijke Drysdale (Food Security and Agricultural Projects Analysis Service), Jorge Mernies (Statistical Analysis Service), Prakash Shetty (Nutrition Planning, Assessment and Evaluation Service) and outside reviews from DFID and William Liefert (Economic Research Service, United States Department of Agriculture). Technical background papers cited in the references were provided

by the following Russian experts: Sergei Shashnov and Ludmilia Korbut, Lilia Ovcharova, Evgeniia Serova, Aleksandr Baturin and Aleksandr Korbut. The household survey utilized in this study was undertaken by Association Agro in 11 *oblasts* of the Russian Federation (Khabarovsk, Volgograd, Leningrad, Rostov, Orel, Omsk, Novosibirsk, Nizhnii Novgorod, Moscow, Kirov and Sverdlovsk). The summary of the Association Agro report on the results of the household survey was written by Aleksei Emelianov (Russian Cadastre Centre "Zemlya").

The project *Food security assessment in the Russian Federation* was jointly operated by the Emergency Operations Service and the Policy Assistance Branch of the Regional Office for Europe (REUP). Project coordination was provided by Bernhard d'Avis (REUP) and Raimund Jehle (REUP) with technical support from Sophia Davidova (Wye College). FAO consultants Stefan Kuellmer and Pavel Cernohorsky carried out food security assessments in Tyva and Kamchatka *oblasts* under the project in 2001.

Prabhu Pingali
Director
FAO Agricultural and Development Economics Division

David Sedik
Economist
FAO Regional Office for Europe

Executive summary

This paper addresses both the situation of food security and the outlook for removing constraints on food security in the future. Chapter 1 outlines the changes in agricultural production in the 1990s that have led to a policy debate on food security in the Russian Federation today and reviews Russian views on the topic. Chapters 2 through 4 assess the state of food security using three core concepts. Chapter 2 critically assesses the main indicators of food availability in the country; Chapter 3 discusses the evidence on access to food by the population; and Chapter 4 discusses the nutritional status and diet of the population. Chapter 5 discusses the outlook for improvements in the state of food security.

Policy debate on food security

The debate over "food security" in the Russian Federation over the past ten years has really been over agricultural policy. More specifically, it concerns how to interpret the changes in agricultural production and consumption that have accompanied the introduction of reforms in the Russian economy. There have been two quite important changes in production in the country since policy reforms started in 1992: a sizeable fall in livestock inventories and a corresponding fall in production of feed grain. Accompanying these changes has been a sizeable fall in imports of grain and an increase in that of meat. On one side, the agricultural establishment has interpreted these changes as an ongoing "crisis" in the agricultural sector that threatens the food security of the country. On the other side of the debate, a small number of agricultural economists within the Russian Federation have pointed out that changes in food production have been caused by an adjustment in consumer purchases in line with a switch away from massive consumer subsidies toward actual scarcity prices for livestock products. In this respect, these changes in agricultural production were an inevitable part of a long-term market reform and consistent with an adjustment toward the comparative advantage of the Russian Federation in the production of crop rather than livestock products.

Food availability

Sizeable falls in livestock and grain production in the Russian Federation in the early 1990s have inspired three concerns about the food security of the country. First, to what extent has food availability changed in the transition period? Second, to what extent has the country become more dependent, perhaps overly dependent, on imported food? And, third, to what extent is food availability of outlying areas threatened by the falling production trend?

On average, the Russian Federation does not appear to be food insecure by measures of food availability. Moreover, food availability does not seem to have fallen significantly in the transition period. In order to address the first question, changes in total food use were measured in terms of calories during this period as well as the mixture of food available to the population. Contrary to fears inspired by sizeable falls in food production, total caloric availability per capita per day has remained nearly constant over the period 1992–1999, declining by 3 percent. Food availability in calories has remained well above food inadequacy levels suggested by the World Health Organization/FAO/United Nations University (WHO/FAO/UNU) during the transition period. Although there have been sizeable changes in the mix and sources of food available, the availability of food in the Russian Federation today is actually higher than in other countries with similar incomes per capita. An international comparison shows that availability of food per capita per day exceeds that in developing countries by 10–30 percent and is about 20 percent less than that in the European Union.

The most significant change in food availability since 1992 has been a change in the mix of foods, away from products of animal origin toward those of vegetable origin. From 1992 to 1999 the percentage of calories available from animal products decreased from 26 to 23 percent. This reflects a decline in meat and milk products consumption and an increase in grain and potato consumption.

Import dependency ratios derived from Russian State Statistical Committee (Goskomstat) data show that there was no uniform trend toward increasing food import dependency in the 1990s. According to Goskomstat commodity balances, the Russian Federation's dependence on imported food between 1991 and 1999 decreased for every commodity, including grain, vegetables, sugar and milk. It increased only for meat, from 13 percent in 1991 to 30 percent in 1999. Using FAO commodity balances, Russian food import dependence is not high by international standards, except for sugar. Russian food import

dependence on grain, oils, vegetables, potatoes, eggs and milk were lower than comparable ratios in western European countries. For meat, import dependence was slightly higher than in western Europe. Dependency ratios in the Russian Federation are also less than for the group of transition economies (including CIS countries) and least developed economies (except for meat).

There is insufficient evidence to assert that administrative trade barriers threaten the food security of the population of Russia in the sense of causing food inadequacy. Average figures on *oblast* level caloric consumption did not fall below the FAO minimum energy requirement of 1 970 calories, on average, from 1997 to 1999. However, administrative barriers raise the price of food for food importing regions. Many of the increases in grain prices for food importing regions of 1997/98 seem to have derived from increased administrative barriers.

Food consumption

Two sources of food consumption information for the Russian Federation are analysed in Chapter 3: the official Goskomstat household budget survey (HBS) information and a special food insecurity survey carried out by Association Agro in 11 *oblasts* of the Russian Federation in December 2000 (AA Survey). The current Goskomstat HBS is an improved version of the Soviet Household Budget Survey carried out in 89 regions of the Russian Federation with a sample size of approximately 50 000 households. The purpose of the AA survey was to measure food consumption and attitudes in a sample of families around or below the official poverty line. The survey covered 2 963 households of 8 750 individuals.

Information on food consumption in 2000 from the Goskomstat Household Budget Survey (HBS) and the Association Agro Food Insecurity Survey cannot give accurate estimates of the degree of food inadequacy in the Russian Federation. The HBS is biased toward poor families and utilizes food conversion coefficients that seem to underestimate caloric consumption by about 10 percent. The AA survey lacks a well-specified sampling frame, so that information from this survey can be used only as a case study of the situation of households near or below the poverty line. Furthermore, comparison of estimates of food consumption from the two surveys indicates that in-kind consumption (and income) appears to be underestimated in the HBS, particularly for the poor.

AA survey information provides three robust conclusions about the incidence of food inadequacy in the Russian Federation. First, food inadequacy seems to

be more severe the more urban the settlement. The greater food security of rural areas appears to be connected with the prevalence of private plots and their role as buffers against poverty. Eighty-nine percent of individuals in rural areas, 71 percent of individuals in other urban and only 46 percent of individuals in capital cities had private plots in the AA survey. A second robust conclusion from the AA survey is that food inadequacy is higher in larger families, though not necessarily in families with large numbers of children. A third conclusion is that pensioner families do not seem to be at higher risk of food inadequacy compared to other families.

Nutrition

In terms of the number of people affected, the pre-eminent nutritional problems in the Russian Federation are overweight and obesity in adults (over 50 percent of adults have a Body Mass Index (BMI) greater than 25) and various micronutrient deficiencies in both adults and children, including iodine and iron deficiencies. These health problems are risk factors for cardio-vascular diseases, certain types of cancer, diabetes, anaemia, goitre, gallstones, arthritis, osteoporosis and dental caries. Moreover, each of these maladies is connected to the unhealthy diet in the Russian Federation. Undernutrition appears to be a very slight problem. Neither child nor adult undernutrition seems to be a sizeable problem in the country.

An investigation of anthropometric indicators of nutrition by income levels highlights an extraordinary pattern: overweight and obesity among both children and adults dominate our findings in every income category. Even in the poorest group investigated, overweight and obesity are far more prevalent than underweight, indicating that undernutrition is a far lesser problem than overnutrition or malnutrition. For instance, in the poorest quintile of individuals from a nationally representative survey of adults and children (RLMS data for 2000) undernutrition indicators ranged from 1 to 12 percent for various subpopulations. However, overnutrition indicators ranged from 23 to 27 percent, depending on the sex and age of the individual.

This evidence points to the extraordinary significance among the population of "subjective factors" such as dietary preferences and policy. Dietary preferences of the population were shaped by previous Soviet policies of subsidizing livestock product consumption and the erroneous belief that large amounts of calories and animal protein were needed to prevent inadequate calorie intake. The high prevalence of overweight and obesity and the health

consequences – cardio-vascular disease, breast cancer, etc. – are largely a consequence of these erroneous beliefs and policies of the past and current lack of knowledge of proper nutrition.

Nutritional problems cannot be held responsible for the sharp decrease in life expectancy from 1992 and 1994. A considerable increase in alcohol consumption during that period seems to be the single most important cause of rising mortality rates in the early reform period. At the same time, once again, the long-term overall mortality pattern is strongly determined by nutritional factors, since it is dominated by cardio-vascular diseases (CVD), which are largely preventable by healthy eating, avoidance of smoking and heavy drinking, and adequate levels of physical activity.

Children's diets in the Russian Federation suffer from a relatively low rate of infant breastfeeding. Nutritional deficiencies during pregnancy and infancy can raise the risk of chronic diseases in later life. Thus, reducing child malnutrition is in the long run a preventive measure against cardiovascular and other lifestyle-related diseases (Popkin, Richards and Montiero, 1996a). Inadequate infant feeding practices, especially the low prevalence of breastfeeding, cause decreased tolerance for infection and malnutrition in infants. For children 0–6 years, evidence was found of overnutrition, which could explain the high prevalence of overweight among five-year-olds. For older children some evidence of undernutrition was found.

Contrary to the perception of many Russians who experienced some degree of deprivation and insecurity during the reform period (Martinchik, Baturin and Helsing. 1997), no deficits in calorie and macro-nutrient consumption were found on the average during the transition process. The average diet of Russians has even become healthier since 1990 due to decreases in milk, meat and fat consumption and a rising share of starchy staples like bread and potatoes. A further change to the better is still hampered by barriers to breastfeeding, poor knowledge of healthy diets and unfavourable food preferences (putting an emphasis on animal products rich in fat and protein and not on fresh fruit and vegetables), false recommendations on dietary intakes as a legacy of the Soviet era and low levels of physical activity (WHO, 2000a).

Chapter I
Food security

By a number of measures food security in the Russian Federation is a matter of great concern at the beginning of the twenty-first century. In 1998 the United States of America and European Union (EU) Governments announced food aid packages valued at over US$1.5 billion for the Russian Federation. The value of United States Government commodity contributions from this total was $409 million, larger than total United States Government food aid to the entire continent of Africa in FY 2000 ($342.4 million).[1] The Government of the Russian Federation is now considering a Doctrine on Food Security, according to which food security is viewed as an important component of national security. And, according to the World Bank, unlike other areas of the world where poverty has decreased in the last decade, poverty in the Russian Federation seems to have increased within the past decade. Since poverty and food insecurity are usually related, it would seem reasonable to suspect that food security has also worsened in the past decade.

With such attention to issues of food security in the Russian Federation, it would seem appropriate to take stock of available information on the topic. How food secure is the Russian Federation? What is the nature of food insecurity in that country? And how can the government ensure a more food secure future? These are the issues that will be addressed in this report.

There are more than 200 definitions and 450 indicators of food security reported in the literature (Hoddinott, 1999). However, there is little

[1] The United States package involved 3.2 tonnes of commodities, and included donations worth about US$589 million (US$409 million for 1.9 tonnes of commodities and US$180 million for transportation), plus a US$520 million trade credit for the Russian Federation to purchase 1.3 tonnes of commodities such as maize, soybeans and meat under P.L.-480 Title I. The donated commodities included 1.7 tonnes of wheat from the Commodity Credit Corporation and 0.2 tonnes of various commodities from the United States Food for Progress Program. The EU package provided 1.8 tonnes of agricultural products (including 1 tonne of wheat) worth US$470 million (Liefert and Liefert [1999], p. 17).

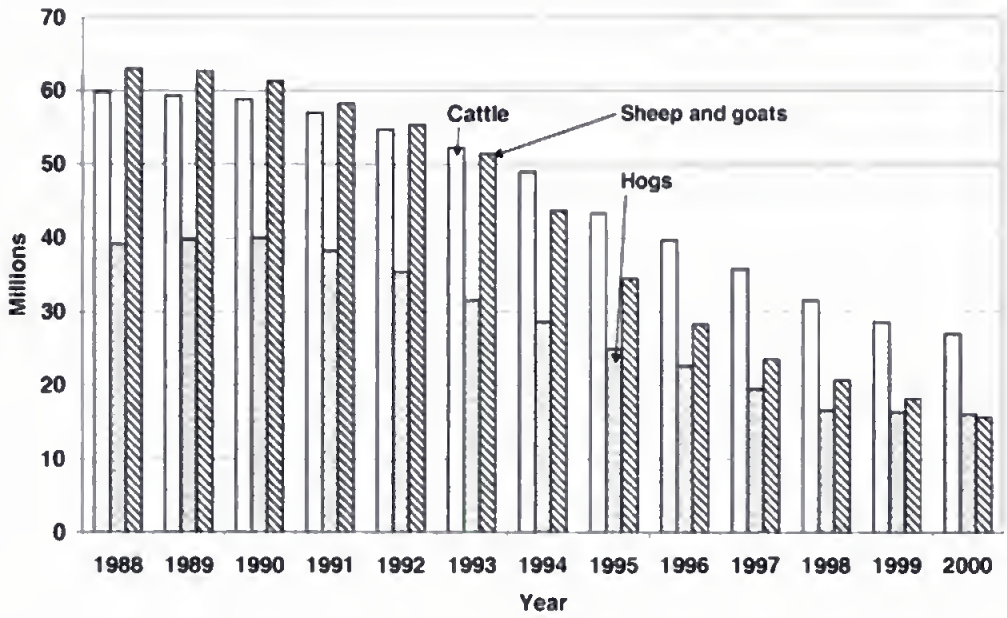
disagreement about the core meaning of the concept. The World Food Summit Plan of Action states, "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." As such, food security involves three related concepts: food availability, access and proper utilization.

This report addresses both the situation of food security and the outlook for removing constraints on food security in the future. Chapter 1 outlines the changes in agricultural production in the 1990s that have led to a policy debate on food security in the Russian Federation today and reviews Russian views on the topic. Chapters 2, 3 and 4 assess the state of food security in the Russian Federation using the three core concepts: Chapter 2 critically assesses the main indicators of food availability; Chapter 3 discusses the evidence on access to food by the population; and Chapter 4 discusses the nutritional status and diet of the population. Chapter 5 discusses the outlook for improvements in the state of food security.

Food security and the Russian transition

The debate over "food security" in the Russian Federation over the past ten years has really been a debate over agricultural policy. More specifically, it concerns how to interpret the changes in agricultural production and consumption that have accompanied the introduction of reforms in the economy. There have been two quite important changes in production in the country since policy reforms started in 1992: a sizeable fall in livestock inventories and a corresponding fall in production of feed grain. Accompanying these changes has been a sizeable fall in grain imports and an increase in meat imports. On one side, the agricultural establishment has interpreted these changes as an ongoing "crisis" in the agricultural sector that threatens the food security of the country. Thus, Khromov (1996) stated, "The main threat to the country's food security comes from the crisis gripping its agriculture and food industry." Gordeev *et al.* continued this line of reasoning by stating, "The key problems for raising the level of food security are to end the decline in food production, renew growth, change the geographical and commodity structure of production to correspond to market demand and increase the quality of production of the agro-industry complex" (Gordeev *et al.*, 2001, v. 1, p. 171). On the other side of the debate, a small number of agricultural economists within the country have pointed out

FIGURE 1
Livestock inventories (1 January)

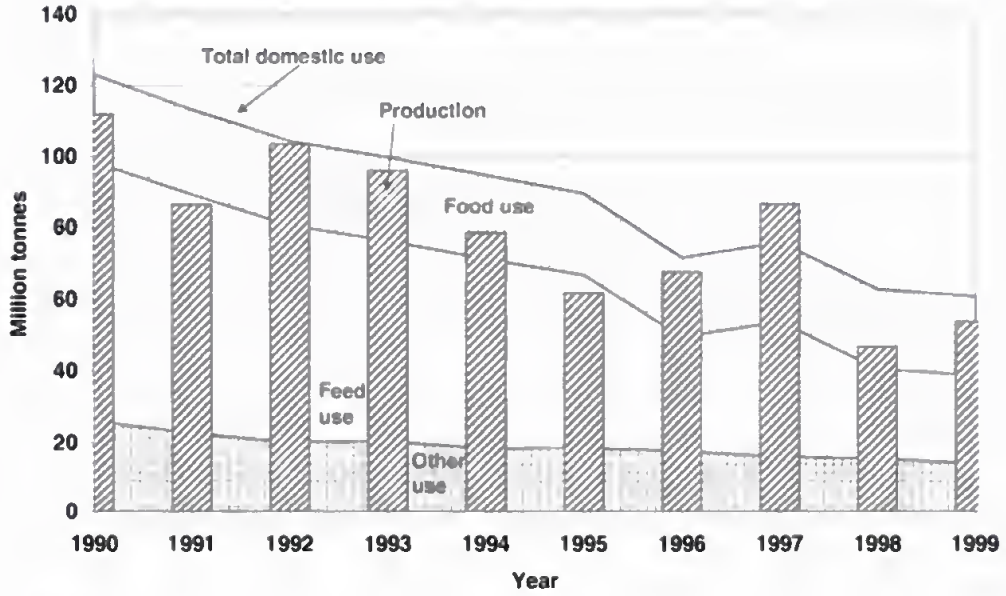


Source: FAOSTAT.

that changes in food production have been caused by an adjustment in consumer purchases in line with a switch away from massive consumer subsidies toward actual scarcity prices for livestock products. In this respect, these changes in agricultural production were an inevitable part of a long-term market reform and consistent with an adjustment towards a comparative advantage in the production of crop rather than livestock products.

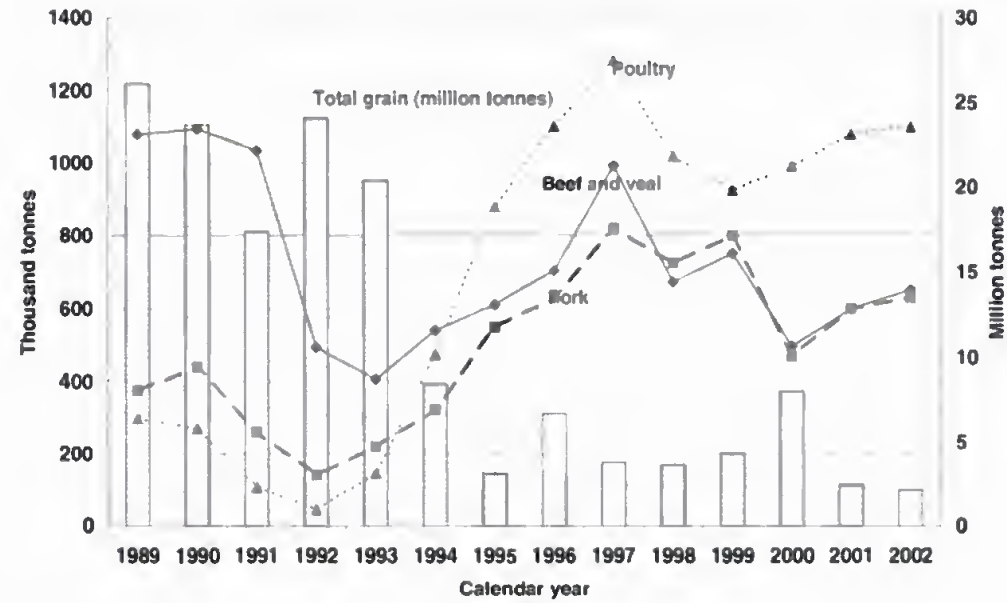
The dramatic fall in livestock inventories that has occurred since reforms began in 1992 can be seen in Figure 1. Cattle and hog inventories on 1 January 2000 were less than half their level in 1988 and sheep and goat inventories about one-third. The changes in grain production and domestic use that accompanied this change in inventories can be seen in Figure 2. In that figure, the bar shows production, while total domestic use is illustrated by the area graph. Total grain for domestic use is production + net imports + stock changes. Note that although production and total domestic use during the period under consideration both fell by about one half, most of the fall in

FIGURE 2
Grain production and use, calendar years 1990–1999



Source FAOSTAT.

FIGURE 3
Import of grain and meat, 1989–2002



Source ERS/USDA PS&D Database (2002)

production was of grain used for feed. Whereas food use of grain fell by about 10 percent, feed use fell by 66 percent.[2]

These changes in livestock inventories, grain production and use were accompanied by a significant turnaround in agricultural trade. The USSR was the largest grain importer in the world in the 1980s, importing an average of 36 million tonnes per year, much of which went to Russia (Figure 3). At the end of the 1980s the Russian Federation was importing about 20 million tonnes of grain per year.[3] After 1993, however, the Russian Federation drastically reduced imports of grain. This is entirely reasonable, since feed demand for grain had fallen due to the fall in livestock inventories. Meat imports, particularly of poultry meat, increased rather dramatically in these years (Figure 3). The rouble devaluation of 1998 caused a decrease in meat imports. But healthy economic growth between 1999 and 2001 fuelled a growth in meat imports once again.

The main reasons for these revolutionary changes in Russian agricultural production, use and trade lie in a change in the position of the livestock sector in Russian agriculture in the Soviet period and after. In the 1960s and 1970s, Krushchev and particularly Brezhnev made the decision to improve the Soviet standard of living primarily by increasing consumption of livestock products. To increase meat production, the Brezhnev regime concentrated on investing in "industrial" livestock production (Van Atta, 1993). Demand for meat was ensured by keeping Soviet retail prices for meat virtually constant from the mid-1960s to 1990. Increasing livestock inventories also required increases in grain for feed. Soviet grain production increases (predominantly in Russia and Kazakhstan) of about 60 million tonnes per year from the early 1960s to the late 1970s was not sufficient to support the increase in livestock inventories. For this reason, Soviet imports of grain increased from near zero in 1970 to 36 million tonnes per year in the 1980s (Shend, 1993).

The campaign to raise livestock consumption in the USSR was supported by sizeable subsidies to both consumers and producers for livestock products, particularly for beef and pork. In the USSR consumers were heavily subsidized

[2] The actual changes in food use of grain are difficult to determine, because a significant portion of bread was given to animals as feed during the Soviet period. After 1992, when bread gradually became more expensive, it is likely that feed use of bread declined (OECD, 1991, p. 168).

[3] Grain import data in Figure 3 is in marketing years, while livestock data is for calendar year. The series are aligned such that calendar year 1989 meat import data is compared with grain data utilized in that calendar year (1988). This is MY July/June 1988/89 grain import data.

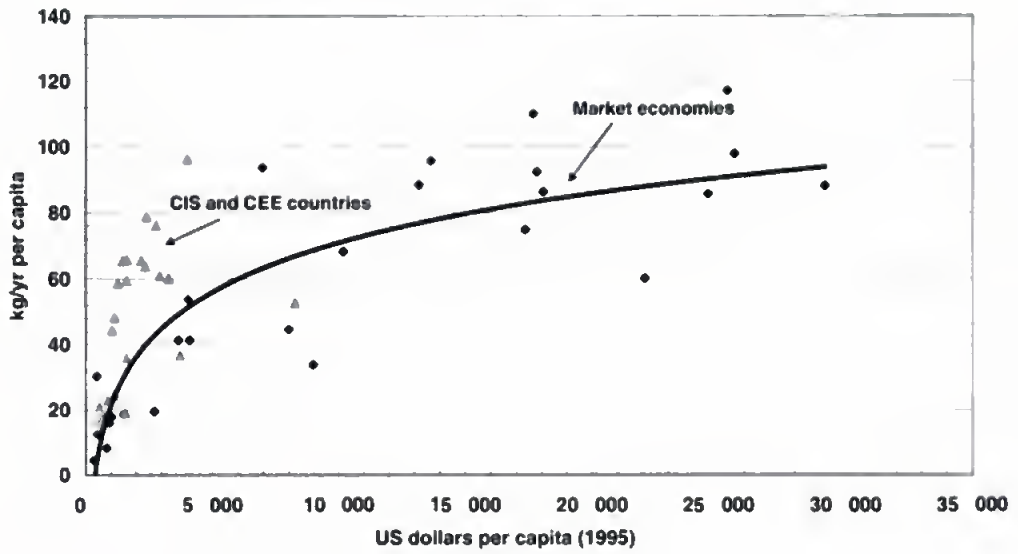
for livestock products, while producers were subsidized mildly (ERS/USDA, 1994). This meant that the true cost of production of meat in the USSR was considerably higher than the price paid by consumers. Soviet producers received subsidies to offset the shortfall in revenue. Other eastern European countries followed the Soviet lead, subsidizing livestock products, as well. By 1990, Russian food and agricultural subsidies, primarily for livestock products, reached an astounding 11.8 percent of GDP (World Bank, 1997).

The result of state support to livestock producers and consumers was that consumption of livestock products in CEE and CIS countries was higher than consumption of these products in market economies of similar GDP. This "overconsumption of meat" in the CEE and CIS countries in 1992 can be seen by comparing the CEE and CIS countries in Figure 4 with the trend line drawn using market economy points as a reference. The CEE and CIS countries are arrayed above the market economy trend, except for the countries of the former Yugoslavia, Macedonia, Croatia and Slovenia. These eastern European countries were neither in the Soviet bloc nor did they share Soviet-type agricultural policies. Their position in Figure 4 is closer to the trend line derived from market economies. This difference is consistent with the proposition that higher meat consumption was not a matter of regional consumer preference, but of policy differences.

With the beginning of reforms in 1992, demand for livestock products fell rapidly as real wages fell. Moreover, subsidies to producers to support livestock fell abruptly. These demand and supply side pressures caused derived demand for livestock inventories to fall. After 1992 the livestock sector and Russian meat consumption were gradually made more consistent with actual costs of production and consumer income. But the fall in the demand for livestock started a chain reaction that led to a fall in demand for livestock feed, and thus grain production and imports. Feed use of grain fell continuously throughout the 1990s, as livestock inventories were reduced (Sedik, Foster and Liefert, 1996).

These changes in production, use and trade appear to be consistent with Russian comparative advantage in agriculture. Liefert (2002) used Social Cost Benefit (SCB) ratios to calculate whether the country had a comparative advantage in crops or meats, and compared trade flows with the implications of his calculations. The social cost benefit ratio gives the value of all resources used to produce a given good, with tradable inputs valued at trade prices, divided by the total foreign exchange that the good would earn if exported. Thus, the ratio compares the value of resources used to manufacture the good domestically versus the cost

FIGURE 4
Per capita GNP and meat availability, 1992



Sources: FAOSTAT and World Bank (2002)

to the country of importing it. Comparing SCB between various crops and livestock products, one can conclude which products are more or less competitive on world markets. The country has a comparative advantage in those products for which the SCB are lower.

In 1996/97 the Russian Federation was more competitive in producing crops, particularly sunflower seed (Table 1), indicated by the comparatively low SCB ratios for this crop. Russian domestic costs of producing poultry and pork were considerably higher than world costs. Thus, movement in the direction of crop production (sunflower seed in particular) seems to have been consistent with the country's comparative advantage.

TABLE 1
Social cost-benefit ratios and trade balances, 1996–1997

	SCB ratios (1996–1997)	Trade balances 1996	1997
Meats			
Poultry	13.45	-0.74	-1.14
Pork	8.21	-0.30	-0.30
Beef	6.61	-0.45	-0.61
Crops			
Wheat	7.06	-1.70	-1.60
Barley	6.94	-0.46	-0.76
Sunflower seed	4.37	1.77	1.04

Note: Negative value of trade balance indicates net imports.
Source: Liefert (2002), p. 15.

Literature on food security and nutrition and the Russian Federation

Most of what has been written explicitly on the topic of food security in the Russian Federation concerns interpretations of reform-induced production changes and implications for agricultural policy. This includes a special (1996) issue of the *Food Systems Policy Roundtable Journal* devoted to issues of food security in contemporary Russia and edited by Richard Nooter. The articles in this journal illustrate both Russian and western views on food security issues. Gordeev *et al.* (2001) presents a Russian view, linked to national security concerns. Outside the country, there is by now a sizeable literature on poverty in the Russian Federation, but food security is usually not specifically covered under this topic.[4] The role of small-scale agriculture in alleviating poverty has recently come under scrutiny in this literature. In the Soviet period the literature on private plots concerned primarily the role of the private sector in Soviet agricultural production and as a buffer sector for food consumption (OECD, 1991). After 1991 private plots again became a topic of discussion, now as a coping mechanism to ensure food security amongst poor urban and rural households (Seeth *et al.* (1998), Debatisse and Rajkumar (1997) and Von Braun, Quaim and Seeth (2000)).

In February 2001, FAO and Association Agro (AA) held a workshop, sponsored by the Department for International Development of the United Kingdom (DFID), at which Russian scholars presented papers on the topic of food security in the Russian Federation. The workshop was the first time that food security issues as they are usually understood in other countries had been discussed in relation to the Russian Federation in a public forum. At the workshop Serova discussed the implications of reforms and agricultural policies for food security in the sense of hunger resulting from poverty (Serova *et al.*, 2001). In this context private plots as a "buffer mechanism" against poverty were discussed. Ovcharova (2001) discussed measures of poverty in the Russian Federation and noted the limited effectiveness of the social welfare system in providing a safety net, even for adequate food consumption. Korbut and Shashnov (2001) discussed measures of poverty and their applicability as measures of food security. Baturin (2001) discussed recent literature on the main nutrition problems in the Russian Federation.

[4] On poverty in the Russian Federation and other transition economies, see Klugman (1997), Milanovic (1998), Braithwaite, Grootaert and Milanovic (1999), World Bank (2000) and OECD (2001).

The Russian literature on nutrition has traditionally emphasized case studies with few references to nutrition policy. However, nutrition has come under great scrutiny in studies outside the region in the past ten years in connection with the drastic fall in life expectancy and deterioration of health conditions in the Russian Federation. Martinchik, Baturin and Helsing (1997) reported on the results of a WHO monitoring effort of Moscow schoolchildren from 1992 to 1995. They found that, although Russians felt that they had been food deprived during the period, there is no evidence that growth of children in the study had been compromised. Popkin *et al.* (1997a) reviewed the history of the nutritional changes from the 1960s to 1990s in Russia and, relying on data from the Russian Longitudinal Monitoring Survey (RLMS) of 1992 and 1993, noted the main health problems which arose during the period. Their findings, similar to those in Sedik (1993) and Van Atta (1993), are that the Russian diet changed dramatically from the 1960s to the early 1990s from one dominated by bread and potatoes to one with high meat and dairy content. These diet changes led to a rise in health problems of the population related to heart and circulatory diseases, maladies normally associated with richer countries.

There have also been a number of studies that have drawn on data collected under the Russian Longitudinal Monitoring Survey (RLMS) (Popkin, Zohoori and Baturin, 1996; Popkin *et al.*, 1997b; Mroz, Henderson and Popkin, 2001; Zohoori, Gleiter and Popkin, 2001). These sources have made available a wealth of information on Russian health and nutrition that was not previously available. Finally, there has been some interest in public health policy and nutrition, particularly from the World Health Organization. The WHO Regional Office for Europe has put out a number of works dealing with nutrition policy for the European region (WHO, 1998a, 2000a, 2001).

Chapter 2
Food availability

Sizeable falls in livestock and grain production in the Russian Federation in the early 1990s have inspired three concerns about the food security of the country. First, to what extent has food availability changed in the transition period? Second, to what extent has the country become more dependent, perhaps overly dependent, on imported food? And, third, to what extent is food availability of outlying areas threatened by the falling production trend?

This chapter considers these questions related to food availability. Changes in total food use as well as the mixture of food available were measured in order to address the first question. Contrary to fears inspired by falls in food production, the total calories available per capita per day actually decreased only slightly over the period 1992–1999. Although there have been sizeable changes in the mix and sources of food available, the availability of food in the Russian Federation today is actually higher than in other countries with similar incomes per capita and average food availability is far above the minimum level established by FAO and WHO.

The second question is addressed by computing import dependency ratios derived from Russian State Statistical Committee data. These ratios show no uniform trend towards increasing food import dependency in the Russian Federation in the 1990s. Moreover, the level of import dependence does not appear to be high by international standards, with the sole exception of sugar. Import dependency ratios are much smaller than in Europe, Japan, Central America and developed market economies. Dependency ratios in the country are also less than for the group of transition economies (including CIS countries) and least developed economies (except for meat).

Last, the extent to which food security in the Russian Federation is threatened by barriers to regional food availability within the country is considered. On this issue there does not appear to be sufficient evidence to assert that administrative trade barriers threaten the food security of the population. However, these barriers do raise the price of food for food-importing regions. Much of the

increases in grain prices for food-importing regions of 1997–1998 seem to have derived from increased administrative barriers.

In conclusion, on average, the Russian Federation does not appear to be food insecure by measures of food availability. Food availability does not seem to have fallen significantly in the transition period. Last, availability of food in the Russian Federation today is actually higher than in other countries with similar incomes per capita.

Changes in food availability in the transition period

Paradoxically, the question of how overall food consumption has changed during the transition period is seldom raised. Certainly, the *prima facie* evidence gives little reason to doubt that the Russian Federation has become more food insecure in the 1990s. From 1992 to 2000, real Russian GDP fell by 24 percent (IMF, 2002), while the real gross agricultural product fell by 29 percent (Goskomstat, 2000a). In fact, most of the fall in production has been of livestock products and feed grain, and the population has substituted other foods to compensate for the fall in production of livestock products. Food availability measured in terms of calories therefore fell by only 3 percent from 1992 to 1999. Though the mix of food available to Russians in this period has certainly changed, the food security of an average Russian during this period does not seem to have been threatened, judging by total calories available. The total calories of an average Russian diet (2 879 per capita per day) are quite above the FAO/WHO guideline for minimum dietary energy requirements for the country (1 970 calories per capita per day).[5]

Food availability measured by per capita dietary energy supply

A measure of food availability must aggregate the availability of a great number of different foods using a common *numeraire*. Economists use money as a common *numeraire* to compute a monetary value of a basket of goods. Nutritionists use calories as a common *numeraire* to compute the nutritional value of a basket of food. The most commonly used measure of food availability is per capita daily dietary energy supply (DES) in calories. FAO calculates DES based on the food use element of food balances. Food balances

[5] The 1 970-calorie figure is a population-weighted average of age-sex specific minimum energy requirements which are compatible with light activity and good health. For information on the methodology of assessing food inadequacy, see FAO (1996), Appendix 3.

contain commodity-specific data in primary (before processing) equivalent on various sources of food supply (domestic production, changes in stocks, trade) and various uses or disappearance of food commodities (feed, seed, industrial and waste). The quantity of food available for human consumption is obtained by estimates based on the growth in final food production.[6] Then, information on the nutrient content of food commodities is used to convert data on food availability into calories, grams of protein and fat, and other nutrients. Food balance data is available each year for most countries worldwide. So DES can be calculated for most countries using a standard methodology each year. This allows international comparison of food availability between countries and over time.

DES calculations can be very useful, but they reflect food availability, not consumption. Consumption information can only be estimated through household surveys.[7] The Russian Statistical Committee (Goskomstat), for example, provides measures of per capita food consumption based on household budget survey information. The Goskomstat estimates of consumption differ significantly from the DES estimates based on food disappearance data (Table 2). The differences in the two series are quite interesting, for they indicate sugar and bread sales and purchases that are significantly higher than consumption. This is consistent with the widely reported diversion of sugar for manufacturing moonshine as well as significant feeding of bread to animals on private plots. Korbut (2001) found that the population of Russia has been consuming significantly less than it purchases of bread and bread products since 1994. The ratio of tonnes of bread and bread products sold to that consumed is now about the same as in 1990, when it is known that significant amounts of bread were fed to animals, much was wasted and there were significant price controls. The larger availability of fruits and potatoes may indicate significant private wine manufacture and potatoes fed to livestock, though this is difficult to show without further study.

[6] In commodity balances the availability (production + imports + stock changes) of a commodity over the agricultural season must equal its utilization for food, feed, waste, industrial and seed. This identity allows researchers to estimate each of the elements of the equation save one and arrive at a residual estimate of the final element. The residual element is often stock changes.

[7] To be more precise, household surveys can measure food availability at the household level. Only food intake surveys measure actual individual-level consumption using, for example, 24-hour food intake recall from individuals.

TABLE 2
Per capita dietary energy supply and consumption estimates, 1999

	FAO DES	Goskomstat consumption	FAO as percentage of Goskomstat
Per capita supply of calories per day	2 879	2 352	122
Per capita consumption of proteins	86	61	141
Per capita consumption (kg) of:			
Sugar (raw equiv.)	40	28	142
Cereals	152	111	136
Potatoes	118	94	126
Fruits	27	22	124
Vegetables	86	81	106
Meat and offal	45	47	95
Vegetable oil	9	10	85
Milk	153	194	79

Sources: FAOSTAT, Goskomstat (2001b).

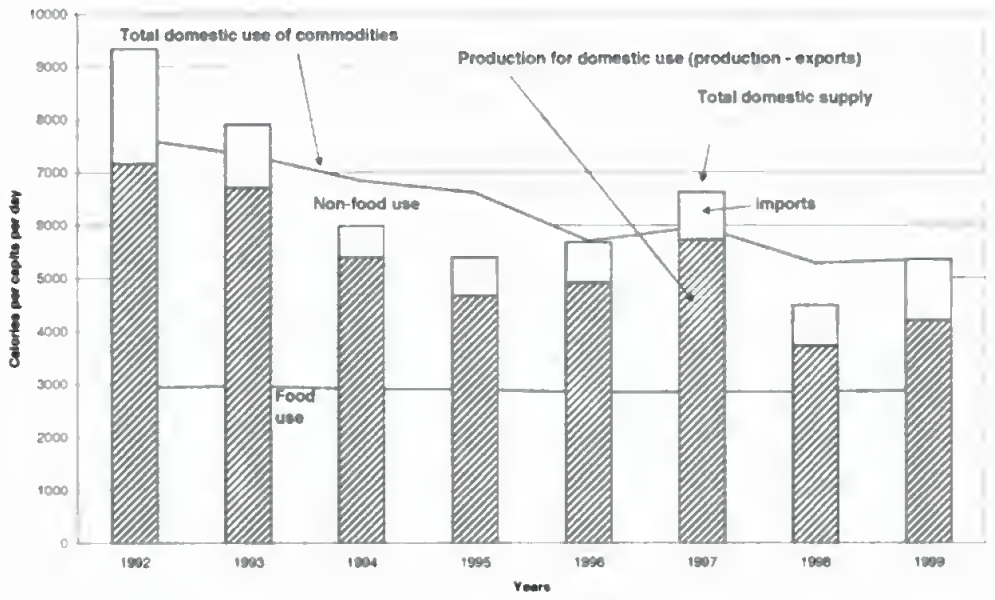
The structure of commodity supply and use, 1992–1999

Despite the large decrease in commodity production from 1992 to 1999 outlined in Chapter 1, nearly all the reduction in use were for seed, feed, waste and industry. The caloric equivalent of food use of commodities in the Russian Federation from 1992 to 1999 decreased only slightly from 2 940 in 1992–1994 to 2 860 in 1997–1999.[8] The stability of food availability in the Russian Federation at just under 3 000 calories per capita per day suggests that there has been little deterioration in food security if interpreted as a decrease in overall food availability from 1992 to 1999.

Estimates of the structure of agricultural commodity domestic supply and use according to FAO commodity balances in terms of calories for 1992 to 1999 are shown in Figure 5. This figure is an aggregate of all Russian Federation commodities estimated by FAO, divided according to supply and use category. Caloric values of domestic supply and use are based on FAO nutritive conversion factors. Total calories per year for each element are divided by the number of days in the year and by the total population of the country in order to render a caloric equivalent of food supply and use elements per capita per day.

[8] Appendix Table A.1 shows the actual figures for Table 2.

FIGURE 5
Commodity supply and use (calories/capita/day)



Source Author's calculations from FAOSTAT

The stacked bar graph in Figure 5 illustrates the caloric value of domestic supply produced or imported in the given year.[9] The two elements of the stacked bars are production for domestic use and imports. The area graph in the figure shows domestic use of commodities in each year in caloric equivalent. Note that total domestic supply produced or imported each year is not equal to total use of each year. This discrepancy is accounted for by stock changes. In some years farms and importers supply more than the amount utilized in the country, in some years less. When domestic supply exceeds use in any given year, there is an increase in stocks. When use exceeds domestic supplies, stocks decline.

Although total food availability hardly changed from 1992 to 1999, the source of that food may have changed away from food purchases and toward food produced for self-consumption. The extent of this phenomenon

[9] Production is a gross aggregate of crop, livestock and fishery production with no deduction for intermediate (such as feed) use. Therefore, aggregating supply for domestic use double-counts calories since calories are counted once in the feed and then again in the meat production. The effect of double-counting is to exaggerate the decline, since double-counting of larger quantities in the earlier years has a larger impact. A figure of the change in total net calories would indicate a considerably more gradual decline.

TABLE 3
Private household contribution to gross agricultural output, 1990–1998 (percentage of total)

Commodity	1990	1995	1996	1997	1998
Cereals	0.3	0.9	0.8	0.8	1.0
Potatoes	66.1	89.9	90.2	91.3	91.2
Vegetables	30.1	73.4	76.8	76.3	79.6
Fruits, berries	50.5	77.4	78.9	79.7	86.6
Grapes	12.3	12.8	10.3	10.1	10.0
Beef, veal	13.2	40.6	44.2	49.2	52.0
Pork	34.2	63.7	65.6	69.7	70.0
Mutton, goat	42.1	71.9	74.4	77.7	81.9
Milk	23.8	41.4	45.4	47.2	48.3
Eggs	21.6	30.2	31.2	30.4	30.1
Wool	24.5	42.8	46.0	51.3	55.0
Honey	69.4	83.6	84.7	86.9	88.1

Source: Goskomstat (1999a), p. 19

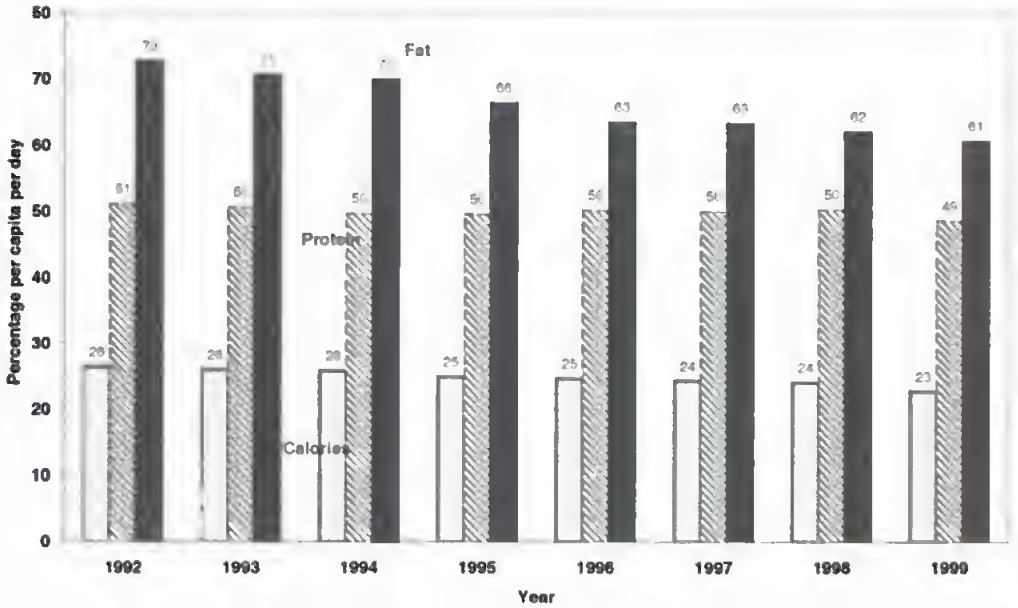
is difficult to gauge exactly, but there is much information that lends support to the widespread impression that Russians have become more dependent on household farming for self-consumption. Since 1990, a trend toward increased production on private plots can be observed (Table 3). Though not all private plot production is used for self-consumption, much of it is.

The structure of food use, 1992–1999

Although the caloric equivalent of total food use hardly changed from 1992 to 1999, its structure – the sources of available food – changed quite profoundly. The percentage of available fat derived from animal products fell rather rapidly over this period, while calories and protein remained nearly constant (Figure 6). At the same time, the percentage of calories, protein and fat from vegetable sources increased. From a nutritional point of view, these are quite positive developments.

A more detailed analysis of the numbers behind Figure 6 show that the portion of calories derived from milk, sugar and sweeteners and vegetable oils increased, while the portion from animal fats and butter, meat, eggs, fish and fruit declined from 1992 to 1999 (Appendix Tables A.2 and A.4). These changes reflect the reduction in purchases of meat as consumer income fell.

FIGURE 6
Percentage of calories, protein and fat available from animal products, 1992–1999



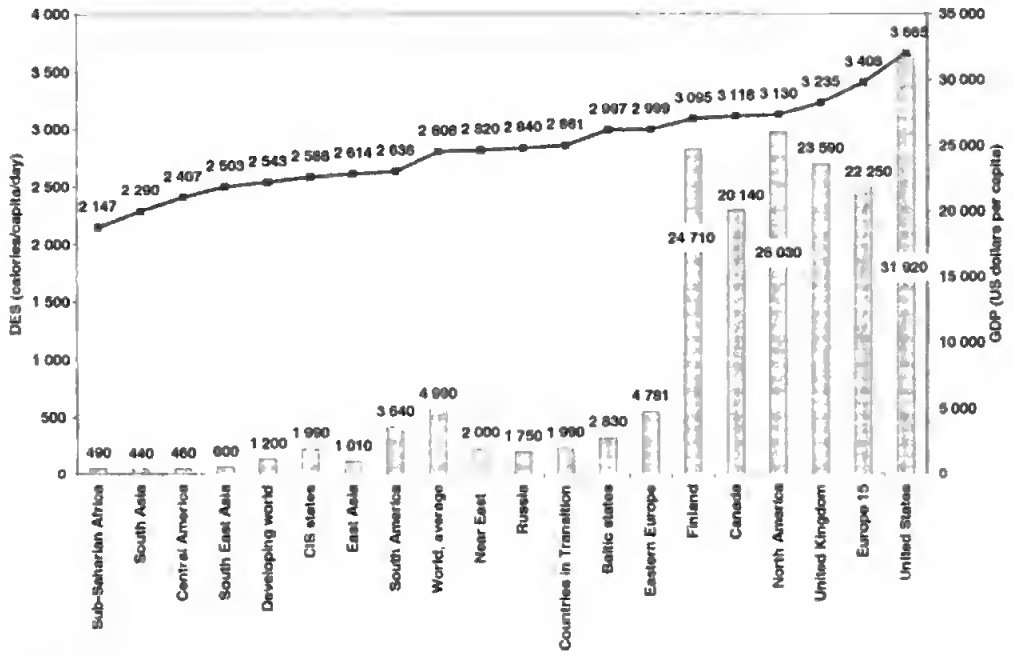
These trends are consistent with per capita consumption data results in terms of calories in the household surveys conducted by Goskomstat for 1995–1999 (Goskomstat, 2000b, p. 136; Goskomstat, 2001a, p. 24).

Despite the changes noted above, in general, the overall structure of food availability from 1992 to 1999 remained rather constant. Russians received slightly more than 40 percent of their total calories from cereals, 11 to 13 percent from sugar and sweeteners, 3 to 4 percent from vegetables and fruits, 5 to 7 percent from vegetable oils and 23 to 26 percent of their calories from livestock products.

Russian dietary energy supply in international comparison

It is helpful to understand the place of Russian levels of dietary energy supply in their international context (Figure 7). In general, there are two important determinants of the level of DES in a country. There is a positive correlation between the level of income (GDP per capita) and DES (FAO, 2000d). This relationship, though, tends to weaken as income increases. Engel's law states that consumers spend a smaller portion of their income on food as their income increases. The second determinant of DES in a country is the physical minimal energy requirement. Since requirements for different age/sex groups

FIGURE 7
Comparisons of per capita DES (average 1996–98) and GDP (1999)



Sources: FAOSTAT, World Bank (2002).

are different, this indicator is a weighted average, based on the structure of the population.

The overall level of dietary energy supply in the Russian Federation is about in the middle between sub-Saharan Africa and the United States (Figure 7). On average, the availability of food in the Russian Federation appears entirely adequate. Food availability is even higher than in a number of countries with higher GDP. This indicates that, relative to its income, Russians consume more calories than would be expected. For instance, in Figure 7, South Americans on average have a higher income, but lower caloric intake. This discrepancy may mean that income in the Russian Federation is undercounted. The shadow economy in the country is known to be substantial. Some have estimated it at 25 to 50 percent of GDP (Kaufmann and Kaliberda, 1996). Another possible explanation of higher food consumption in the Russian Federation relative to GDP is a holdover from the Soviet days when food production and consumption were highly subsidized. Korbut (2001) reports that many regions still subsidize production and consumption of staple foods, particularly bread. The positive

effect of bread subsidies on total caloric intake may be large, given that Russians obtain most of their calories from cereal products.

Third, differences in climatic conditions (more calories are required in cold climates) may also explain part of the difference in calorie consumption between the Russian Federation and countries with similar income. However, differences in climatic conditions account for a comparatively small portion of the total calories required by humans for normal nutrition. According to FAO/WHO/UNU guidelines, Russians require about 10 percent more calories per capita per day for light activity than populations living in the warmest climates (Table 5).

Comparison with other transition economies

From 1992–1998 the dietary energy, protein and fat supplies of the Russian population deteriorated about average compared with other transition economies. A comparison of changes in food availability of transition economies illustrates that the DES, protein and fat contained in food available to Russians deteriorated significantly more than that in the Baltic and Caucasus countries and quite a bit less than that in Belarus, Ukraine and Central Asia (Table 4). These results are consistent with observed trends in both agricultural and overall economic reforms. The Eastern European, Baltic and Caucasus countries have reformed agriculture most effectively through the introduction of individual farms and widespread private ownership of land. These regions have also seen deeper economic reforms leading to economic growth. Belarus, Ukraine, the Russian Federation and Central Asia have retained large farms with serious problems of corporate governance and unclear land tenure. Despite recent economic growth in the Russian Federation and Ukraine, these countries still lag behind Eastern European countries in the depth of reforms (Csaki and Tuck, 2000).

Estimates of food inadequacy from DES data

The average level of DES is insufficient for characterizing the level of food inadequacy in a country. This is because accurate measurement of the extent of food inadequacy requires estimates of the distribution of food within the population. FAO has developed two indicators of food inadequacy, which are analogous to the headcount and income (or expenditure) gap measures of poverty. The first indicator is the prevalence of food inadequacy, the portion of the population whose food consumption is inadequate. The second indicator is the intensity of food inadequacy, showing the additional amount of food needed to eliminate the prevalence of food inadequacy.

TABLE 4
Changes in dietary nutritive supply for transition economies, 1992–98

	1992	1993	1994	1995	1996	1997	1998	Percentage change 92-98
				Calories/Capita/Day				
Eastern Europe	3132	3140	3089	3126	3174	3146	3169	1
Baltic republics	2772	2739	2834	2887	2969	2966	3052	10
European U55R	3171	3163	2950	2914	2869	2870	2903	-8
Russian Federation	2928	2967	2913	2889	2826	2860	2835	-3
Caucasus republics	2128	1920	2064	2141	2331	2260	2266	6
Asian U55R	2684	2623	2657	2538	2539	2566	2495	7
				Protein/Capita/Day (gr.)				
	1992	1993	1994	1995	1996	1997	1998	
Eastern Europe	91	92	90	92	93	92	93	2
Baltic republics	103	97	97	92	91	88	92	-11
European U55R	91	89	85	83	82	81	81	-11
Russian Federation	92	91	89	88	87	89	88	-4
Caucasus republics	66	59	61	60	67	66	65	-1
Asian U55R	80	78	79	75	75	75	73	-8
				Fat/Capita/Day (gr.)				
	1992	1993	1994	1995	1996	1997	1998	Fat
Eastern Europe	106	103	101	103	104	102	105	-1
Baltic republics	85	83	87	88	87	87	92	9
European U55R	86	81	78	76	75	74	73	-14
Russian Federation	81	82	81	80	78	78	74	-8
Caucasus republics	34	30	36	35	42	40	42	25
Asian U55R	66	68	67	65	64	63	64	-3

Source: FAOSTAT

The FAO methodology for deriving country-level estimates of food inadequacy relies on a distribution of food access expressed in dietary energy terms, generated from per capita DES data from food balance sheets and estimates of variations in food distribution derived from income distribution data. A cut-off point based on country-specific minimum energy requirements is then applied in order to derive the percentage of people with inadequate food consumption. Minimum food energy requirements for each country are calculated by FAO based on guidelines set by a Joint FAO/WHO/UNU Expert

Consultation on Energy and Protein Requirements (1985). The minimum daily energy requirement for a country population is a weighted average of energy requirements for light activity for various age and sex groups.

The FAO methodology for estimating food inadequacy is described in *The sixth world food survey* as follows.[10]

1. It is assumed that the pattern of the distribution of per capita dietary energy (calorie) consumption within each country is log-normal so that the levels of energy consumption throughout a population can be calculated simply from the mean and standard deviation (SD) .... Thus, based on the per capita DES derived from FAO food balance sheets and on an estimated value of the coefficient of variation (CV), the distribution of per capita calorie consumption is generated for each country ....
2. Based on nutritional considerations, an estimate is made of the minimum per capita dietary energy requirement (cut-off point) below which the average person's intake is considered to be inadequate; the average person is defined as the weighted average of one person from each of the age-sex groups adopted for estimating energy requirements.
3. The next step is to calculate the proportion of the population that consumes less than the minimum requirement, using the distribution of per capita calorie consumption (obtained following step 1 above) and the minimum per capita energy requirement.
4. Finally, the calculated proportion is multiplied by the size of the total population to obtain an estimate of the number of people who have inadequate access to food.

FAO estimates of food inadequacy in the Russian Federation are about average for middle-income countries and low compared to most developing countries (Table 5). On average, available food more than adequately covers the minimum energy requirement in kcal/person/day. Actual per capita supply of food per day in 1996–1998 (2 840 calories) was 44 percent higher than the minimum energy requirements recommended by FAO for the country (1 970 calories). This is a better-than-average safety margin compared with the other countries and regions shown in the table. The Russian Federation in this respect is comparable to other countries in transition and middle-income countries, and significantly better off than most developing countries. The percent of food inadequacy is about average

[10] From FAO (1996), pp. 33–34; a more complete explanation of the methodology may be found Appendix 3 of the same document.

TABLE 5
Indicators of food inadequacy for selected countries and regions

Region/Country	Per capita average dietary supply kcal/ day 1996–98	Minimum energy requirement kcal/ person/day 1996–98	Percent of food inadequacy in total population 1996–98
Developing world	2 543	1 842	18
Asia and Pacific	2 387	1 824	17
East Asia	2 614	1 906	12
South East Asia	2 503	1 803	13
South Asia	2 290	1 798	23
Latin America	2 637	1 872	11
North America	3 130	1 890	5
Central America	2 407	1 805	20
South America	2 636	1 860	10
Near East and North Africa	3 000	1 855	10
Near East	2 820	1 849	13
North Africa	3 180	1 860	4
Sub-Saharan Africa	2 147	1 818	34
Countries in transition	2 861	1 959	6
CIS countries	2 588	1 930	6
Baltic states	2 997	1 953	3
Eastern Europe	2 999	1 995	3
Russian Federation	2 840	1 970	6

Source: Regional DES and minimum energy requirement estimates based on figures in SOFI 2000, FAO (2000c).

(6 percent) when compared to other transition economies, but far less than that of developing countries. This figure is nearly the same as for Mexico (5 percent), but much lower than that for developing countries as a whole (17 percent) and for sub-Saharan Africa in particular (34 percent).

The depth of hunger in the Russian Federation also seems to be relatively mild compared to developing countries. The depth of hunger is measured by taking the difference between a country-specific minimum energy requirement and the dietary energy supply of individuals suffering from food inadequacy expressed in kilocalories per person per day. The higher the number, the deeper is hunger (FAO, 2000c, p. 2). The depth of hunger in the Russian Federation is more than that of developed countries. For example, hunger depth in the

country was calculated at 170 calories, while that in the UK, Germany, France and Japan, for example, was 130 calories. But the Russian deficit is quite a bit lower than that for such developing countries as Bangladesh (340 kcal), Thailand (260 kcal), Iraq (210 kcal) and Somalia (490 kcal). The Russian deficit is similar to such countries as Jordan, Turkey, Lebanon and Costa Rica, which are also middle-income countries.

The FAO estimates of food inadequacy have a number of limitations.[11] First, they rely quite heavily on the accuracy of the underlying food balance data. Typically, the most accurate items in food balances are production and feed use, because information on area and livestock inventories is usually available. Food use, waste and stock changes are often estimated based on less information and are probably less accurate. Though food balances may be reasonably accurate for the purposes of assessing overall trends, items such as waste and food use in balances may not be accurate enough to produce robust estimates of available calories per capita. Second, estimates of available calories rely crucially on the accuracy of nutritive conversion coefficients for each food considered in the estimate of overall calorie availability. These coefficients vary from country to country, because the nutritive content of foods differs. But countries seldom update these coefficients to keep pace with changes in the nutritive content of food over time, and often take them from other sources, such as other countries or international organizations. Thus, their accuracy can vary substantially from country to country. Third, estimates of the coefficient of variation are taken from national household budget surveys when they are available. Such estimates are only as accurate as the surveys on which they are based.

The FAO estimation methodology has been criticized for underestimating food inadequacy in the world in general, though it is far from clear that the limitations in the methodology employed by FAO are as severe as has been claimed (Svedberg, 2001). However, even if FAO underestimates food inadequacy in the Russian Federation by 50 percent, so that the actual incidence is 9 percent and not 6 percent, food inadequacy in other parts of the world would have to be increased as well, since the same methodology is used for deriving those estimates. Even if the FAO estimate of Russian food inadequacy is lower than actual, it is still much less than in other areas of the world. Nevertheless, clearly, there is much room for further research into this crucial issue.

[11] The literature on measurement of food inadequacy and undernutrition is vast. Some recent contributions focusing on the FAO methodology and comparing it with others are Naiken (2002), Smith (2002), Ferro-Luzzi (2002), Shetty (2002), Kennedy (2002) and Mason (2002).

Changes in import dependency in the transition period

Food insecurity is widely used in the Russian Federation as an argument for government intervention in agriculture in the form of price supports, import tariffs or quantitative import restrictions. A number of Russian authors have suggested that the level of import dependence in the country is too high. For example, Khomiakov and Iskandaryan (1997) argue that food import constitutes more than 50 percent of total food consumption and that the optimal level of food import dependence should not be higher than 15 percent of domestic consumption. The estimates shown in Table 6, derived from Russian Goskomstat data, show that the actual level of the Russian Federation's dependence on food imports is much less than 50 percent of consumption and even well below 35 percent for most commodity groups.

Liefert and Liefert (1999) made a more sophisticated estimate of Russian overall food import dependency. Their calculations make two major adjustments to take account of known drawbacks of Russian statistics. First, food import is adjusted upward by 20–30 percent in order to include barter trade and "shuttle trade" by small-scale food importers that are not recorded in official statistics. Second, domestic production is also adjusted upward to account for agricultural production underreported in official statistics. Liefert and Liefert estimated total food import dependency in the Russian Federation at about 20 percent.

There was no uniform trend toward increasing food import dependency in the Russian Federation in the 1990s (Table 6). The country's dependence on imported grain – usually a basic needs indicator of food security – fell

TABLE 6
Import dependence ratios (percentage share of import in total availability of commodity)

	1991	1995	1996	1997	1998	1999	1991–97 (% change)	1997–99 (% change)
Vegetable oil	28	33	26	48	37	32	75	-33
Meat	13	25	26	36	29	30	177	-15
Vegetables	19	8	10	11	8	10	-44	-4
Milk	11	13	11	15	10	10	34	-35
Sugar	30	27	23	16	6	8	-47	-48
Grains	12	3	3	3	1	3	-79	15
Eggs	2	0	1	2	0	0	-7	-82
Potatoes	2	0	0	0	0	0	-88	-29

Source: Author's calculations based on Goskomstat food balance data.

TABLE 7
Food import dependency ratios: international comparisons

	Cereals	Sugar	Oils	Vegetables	Potatoes	Eggs	Milk	Meat
World	15	32	45	6	6	2	4	10
Industrialized countries	18	30	51	23	17	6	4	17
Europe	18	49	74	22	8	8	4	21
Asia (developed)	83	51	26	17	19	1	1	46
Least developed	16	40	54	2	1	6	3	3
Central America	42	12	51	7	19	1	14	17
Eastern Europe	5	29	38	8	1	2	1	6
Transition markets	9	60	42	8	2	3	1	13
CIS	13	73	43	7	2	3	1	18
Russian Federation (FAO)	13	86	53	14	2	3	1	24

Source: FAOSTAT.

substantially from 1991 to the mid 1990s. The Russian Federation today is virtually self-sufficient in grain. The fall in meat production, in accordance with apparent Russian comparative advantage in crop production, means that the country imports about 30 percent of meat (primarily poultry and pork) from abroad. Russian oil crushing facilities are, on the whole, not competitive (in price and quality) with crushing facilities abroad. Thus, the Russian Federation exports oilseeds, rather than crushing and refining oil domestically.

A comparison of the food import dependency of the Russian Federation with other countries using FAO food balance data shows that the level of import dependence in the country is not high by international standards, with the sole exception of sugar (Table 7). Import dependency ratios for the Russian Federation are much smaller than in Europe, Japan, Central America and developed market economies. Dependency ratios are also less than for the group of transition economies (including CIS countries) and least developed economies (except for meat). Only Eastern European countries tend to have lower food import dependence ratios than the Russian Federation. The notable exception is sugar, which has been the subject of a special import relationship with Cuba for many years. The Russian meat import dependency ratio is only slightly higher than in other countries.

Interregional comparisons

The Russian Federation is a large country that is divided administratively into nearly 90 regions. The differences among Russian regions in terms of natural endowments and level of economic development are comparable to the gaps

between developed medium-income nations and developing countries. The distribution of agricultural production does not coincide with the country's population by region. Large differences in per capita production of food products in a well-functioning market economy are not a problem, but rather an indicator of existing comparative advantage and interregional trade potential. However, there are concerns (Serova *et al.*, 2001; Korbut, 2001) that underdeveloped marketing infrastructure and barriers to trade in the Russiaa Federation create sizeable obstacles to the free movement of food, so as to threaten the food security of some regions. Although trade barriers have been outlawed by Presidential Decree several times (most recently in 2000), local governments still limit the flow of food products by imposing non-tariff measures, such as veterinary and sanitary controls. According to Korbut (2001), in 1999, 40 out of 78 regions had some form of restrictions on grain export. Perhaps partly as a result, 92 percent of grain produced in a particular *oblast* is also marketed within the same *oblast*.

It is difficult to say that administrative trade barriers threaten the food security of the population of the Russian Federation. However, these barriers do raise the price of food for food importing regions. The evidence seems to indicate that much of the increase in grain prices for food importing regions of 1997–98 derived from increased administrative barriers.

Descriptive statistics on the regional distribution of per capita production for principal food commodities illustrate that there are some regions that do not produce one or more commodities at all (Table 8). The difference between average and maximum per capita production is as high as a factor of 4–5 for grains, potatoes, vegetables, meat and milk. For sugar beet and sunflower seed, it is even greater (10–12).

There is ample qualitative evidence of increasing administrative barriers to trade in the Russian Federation. However, in order to understand the magnitude of these barriers, it would be best to have a quantitative measure of their effects. One such quantitative measure is movements in the coefficient of variation of commodity prices between regions from 1995 to 1999. The logic for interpreting this statistic is as follows. In a free market economy, prices between regions should differ by the amount of transportation costs between regions. Over time, these prices may converge due to a fall in transport and handling costs, but such increases in efficiency take time. In the short run, then, the change in prices in the country may depend greatly on administrative (and other transaction) costs. In an economy in which costs of transporting goods between regions,

TABLE 8
Descriptive statistics for regional distribution of per capita production, 1999 (kg)

	Grain	Sugar beet	Sunflower	Potato	Vegetables	Meat	Milk
Mean	323	87	19	257	93	52	233
Standard error	39	24	5	22	7	3	16
Median	189	0	0	217	84	50	218
Minimum	0	0	0	0	0	0	0
Maximum	1 522	1 062	199	1 219	374	194	963
Maximum to mean ratio	5	12	10	5	4	4	4
Coefficient of variation	112	251	219	77	66	59	63

Source: Author's calculations based on data from Goskomstat.

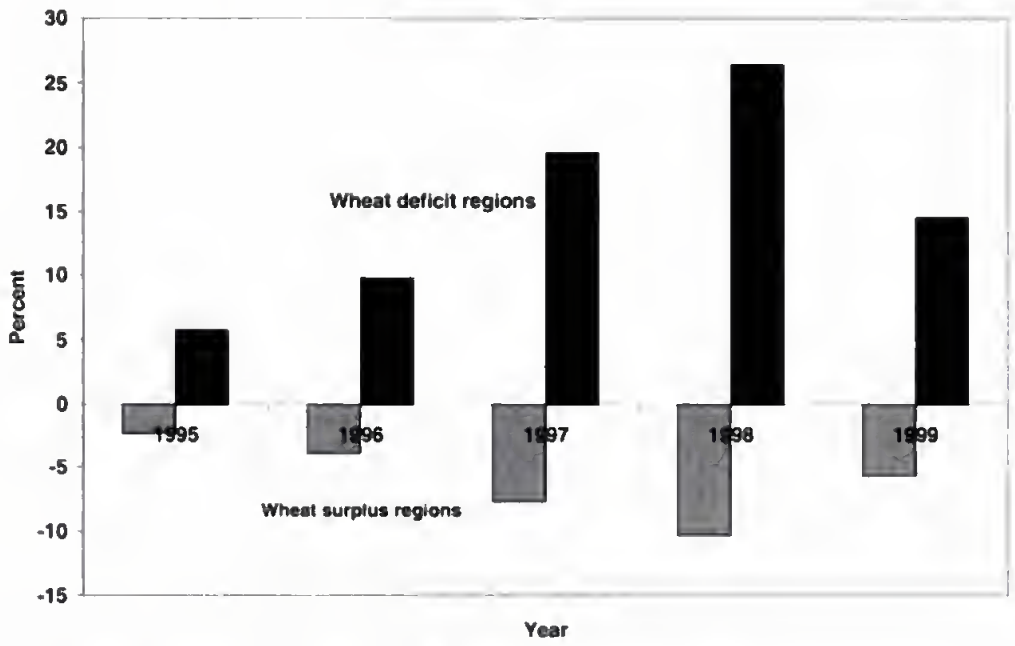
including physical transportation costs and administrative (transaction) costs, are declining, one would expect a measure of the variation of prices between regions to decrease. By contrast, in an economy in which transaction costs are increasing, one would expect the price variation between regions to increase.

Evidence based on the coefficient of variation of wheat prices indicate increasing administrative and transaction costs from 1995 to 1998 and decreasing costs from 1998 to 1999. The coefficient of variation of wheat prices in the Russian Federation increased steadily from 1995 to 1998, from 24.96 to 41.76. This is part of the evidence for increasing administrative/transaction costs. The second part of the evidence is that in 1999, after the abrupt rise in the rouble–dollar exchange rate, the coefficient of variation of wheat prices quickly fell back to the level of 1995 (to 23.12). This rapid elimination of the costs of transporting wheat between regions could not have come from a quick reduction in the physical costs of transportation. It must have come from a reduction in administrative or transaction costs. The rise in the coefficient of variation from 1995 to 1998 was most probably the result of rising administrative transaction costs.

Transaction costs of transporting grain between regions fell so rapidly from 1998 to 1999 due to an increase in competition in trade between regions. Increased competition came with an increase in interregional grain trade fuelled by the need to compensate for declines in import sources of supply. Korbut (2001) provides evidence of increased middlemen activity on the Russian domestic grain market after rouble devaluation. He also mentions a steady decline in profit margins of intermediaries after 1998, indicating increased competition among them. The results support the conclusions of Gardner and Brooks (1994) and Korbut (2001) that food prices in the country before 1998 were dominated by *oblast-*

FIGURE 8

Percentage deviation of wheat prices from average in wheat deficit and surplus regions, 1995–1999



Source: Author's calculations based on data from Goskomstat

level regulations that broke the country up into a number of regional markets, rather than one nationally integrated market. However, the rouble devaluation of 1998 seemed to have a beneficial effect on competition in grain trade, forcing down administrative and transaction costs (Figure 8).

Chapter 3
Food consumption and inadequacy

There are two principal schools of thought on how to measure food inadequacy and undernutrition on the national level.[12] The first is to use statistics on food availability (based on commodity balances) or consumption (based on household surveys) to estimate the incidence of food inadequacy. The second is to use anthropometric measures of undernutrition to estimate the portion of undernourished persons in the country. This chapter examines evidence on food inadequacy using measures of consumption based on household surveys. Household survey information is compared with FAO estimates of food inadequacy derived from commodity balances from Chapter 2, and the determinants of food inadequacy based on survey data are considered. Anthropometric evidence on undernutrition is considered in Chapter 4.

The authors know of no satisfactory estimates of food inadequacy for the Russian Federation. Measurements of the portion of food-inadequate population in the country have significant methodological problems, ranging from sampling biases to lack of a sampling frame to uncertain food conversion coefficients. Not surprisingly, estimates of the portion of the food-inadequate population are highly divergent and most are difficult to reconcile with measures of undernutrition. Information on food consumption in 2000 from the Goskomstat Household Budget Survey (HBS) and the Association Agro Food Insecurity Survey is analysed in this chapter. Neither survey can give accurate estimates of the degree of food inadequacy in the Russian Federation. The HBS is biased toward poor families and utilizes food conversion coefficients that seem to underestimate caloric consumption by about 10 percent. The AA survey lacks a well-specified sampling frame, so that information from this survey can

[12] Shetty (2002) makes this distinction clearly. Food inadequacy and undernutrition are different, though related, terms. Food inadequacy refers to food intake that is continuously insufficient to meet dietary energy requirements. Undernutrition is a state of being, the result of inadequate food consumption, poor absorption and/or poor biological use of nutrients consumed. Food inadequacy can be measured by comparing food intake with a reference level, while undernutrition is a state, often measured by comparing anthropometric indicators to a reference population.

be used only as a case study of the situation of households near or below the poverty line. Furthermore, comparison of estimates of food consumption from the two surveys indicates that in-kind consumption (and income) appears to be underestimated in the HBS, particularly for the poor.

While the AA survey is not representative of the country as a whole, its limited sample does afford some conclusions. First, household food inadequacy appears to be related to household income, the number of dependents in a family, the number of potential earners and location. Perhaps the most robust conclusion from the AA survey is that food inadequacy is more severe the more urban the settlement. Large cities seem to have the highest incidence of food inadequacy. The greater food security of rural areas may be connected with the prevalence of private plots and their role as buffers against poverty. Eighty-nine percent of individuals in rural areas, 71 percent of individuals in other urban and only 46 percent of individuals in capital cities had private plots in the AA survey. Second, food inadequacy in the AA survey was found to be higher in larger families, though not necessarily in families with large numbers of children. Pensioner families were not found to be at higher risk of food inadequacy compared to other families. Family income was also an important determinant of food inadequacy.

Sources of food consumption

The two major sources of food consumption information for the Russian Federation are the official Goskomstat household budget survey (HBS) and the Russian Longitudinal Monitoring Survey (RLMS). The current Goskomstat HBS is an improved version of the Soviet Household Budget Survey carried out in 89 regions of the Russian Federation with a sample size of approximately 50 000 households. Information from the survey is available quarterly. The RLMS is a panel survey carried out by Goskomstat, but administered by the University of North Carolina in collaboration with the Institute of Sociology of the Russian Academy of Sciences. The latest data available from RLMS is from Round 9 (2000) and the sample size is approximately 4 000 households. The Goskomstat HBS is representative at the national and regional (*oblast*) level, while the RLMS is representative only at the national level. Estimates from the RLMS survey were not analysed here because of our need to compare information from the national survey with that of the Association Agro (11 *oblast*) survey. For this comparison we required information representative at the regional (*oblast*) level.

Association Agro (AA) carried out a special Food Security Survey for this report in 11 *oblasts* of the Russian Federation between December 2000 and January 2001. The purpose of the survey was to measure food consumption and attitudes in a sample of families around or below the official poverty line. The target population of the survey was households below approximately 3 000 roubles of cash income per month. Since the average level of the poverty line in the Russian Federation was 1 234 roubles per month in 2000 and the average household size was 2.84 people, a household receiving 3 000 roubles or less per month was below the poverty line (1 234*2.84=3 505). The survey covered 2 963 households of 8 750 individuals and was stratified by *oblast* and settlement type. The survey sampled nearly evenly in each of three settlement types (*oblast* capital, other urban and rural) in 11 *oblasts* for a total of 33 strata.[13] In the AA survey 81 percent of households and 77 percent of individuals had cash incomes below 3 000 roubles.

Biases of the Goskomstat Household Survey

The Goskomstat HBS suffers from two important drawbacks that make it advisable to treat official Goskomstat figures on average caloric intake, the percentage of undernourished persons and caloric intake by income levels (particularly) with great care. These biases mean that analyses of HBS data in the Russian Federation tend to overestimate food inadequacy. The foremost drawback is the bias of the HBS toward lower-income households (Ovcharova, 2001). In economies in which 25 to 50 percent of GDP is in the shadow economy, it is not difficult to understand why the better-off would be reluctant to declare income and perhaps not participate in a household survey. In previous years (before 1994) the HBS suffered from other sampling biases. Data through 1993 derive from respondents drawn from the rolls of state enterprises and collective farms. The HBS has also been criticized for excluding the very poor, since, as a household survey, it excludes persons living in institutions and the homeless. These criticisms are not exclusive to the Russian HBS, of course. They are a problem for all household surveys, though not necessarily to the same degree.[14]

[13] The 11 *oblasts* were representative of European Russia, Siberia and included one *oblast* from the Far East. They were Khabarovsk, Volgograd, Leningrad, Rostov, Orel, Omsk, Novosibirsk, Nizhnii Novgorod, Moscow, Kirov and Sverdlovsk.

[14] Falkinham and Kanji (2000) assess the limitations of the Goskomstat HBS.

TABLE 9
Nutrient conversion coefficients of selected foods – Goskomstat and FAO

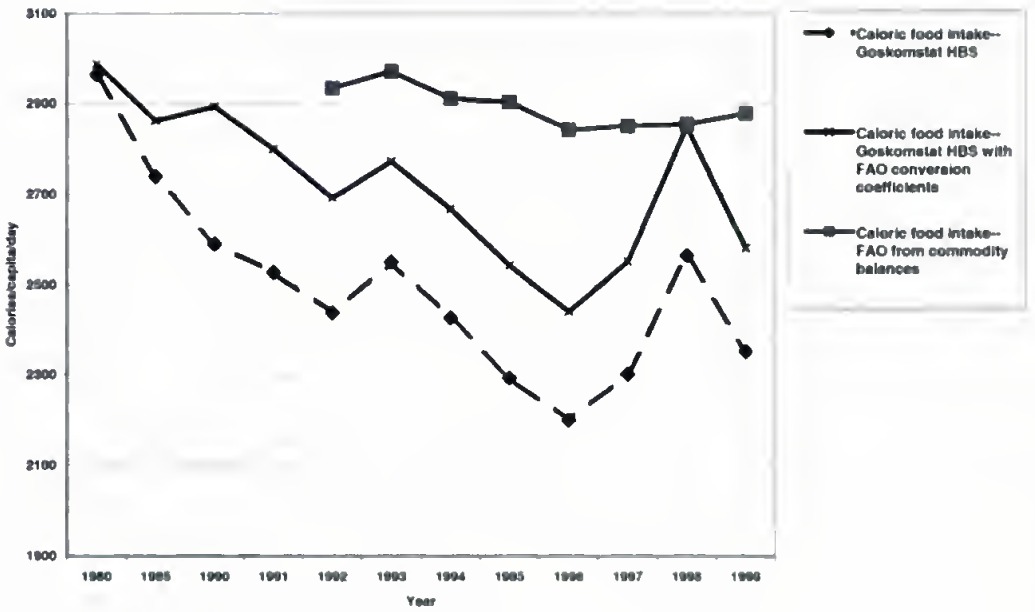
	GOSKOMSTAT			FAO		
	Calories	Protein	Fat	Calories	Protein	Fat
Lentils	270	19.8	1.8	346	24.2	1.8
Wheat flour	298	10.0	1.1	364	10.9	1.1
Rice	292	6.6	0.9	360	6.7	0.7
Macaroni	305	10.3	1.5	367	11.0	1.1
Potatoes	51	1.4	0.3	67	1.6	0.1
Cabbage	20	1.4	0.1	19	1.0	0.1
Melons	22	0.4	0.1	17	0.4	0.1
Sugar	399			387	0.0	0.0
Beef	129	12.9	8.6	225	14.7	18.0
Lamb	115	11.0	7.9	263	13.5	22.8
Pork	255	11.0	23.4	220	13.4	18.0
Poultry	116	9.4	8.6	185	17.1	12.4
Fish	55	8.2	2.4	91	12.6	3.4
Milk	57	2.7	3.1	61	3.3	3.3
Sour cream	166	2.5	15.7	195	2.7	19.3
Cheese	329	23.0	25.5	387	25.0	31.0
Butter	640	0.7	70.3	717	0.9	81.1
Eggs	111	10.2	7.5	163	11.3	12.1
Margarine & other fats	559	0.3	61.5	720	0.6	81.0
Vegetable oil	872		96.9	884	0.0	100.0

Sources: Goskomstat figures from the Government of the Russian Federation (2000); FAO from FAO (2002b).

A second possible drawback of the Goskomstat HBS is its use of nutrient conversion coefficients which produce uniformly lower estimates of the fat and calorie content of livestock products compared to reference conversion coefficients of FAO (Table 9). Pork, which in the Russian Federation has a higher fat content than in western countries, is the sole exception to this generalization. FAO usually prefers country-specific nutrition conversion factors, since the FAO food composition data should be viewed as an average reference level. However, the Goskomstat food composition coefficients differ consistently from FAO coefficients in only one direction, toward an underestimate of the caloric and fat content of livestock products.

Biases of the Goskomstat household budget survey, as well as different methodologies, are responsible for the sizeable (15–20 percent) difference in

FIGURE 9
Caloric food intake, 1980–1999



Source: Calculations based on Table 34

average caloric intake measured using Goskomstat HBS figures compared to the same measure derived from commodity balances. In Figure 9 the line entitled "Caloric food intake – Goskomstat HBS" (average caloric consumption per capita according to Goskomstat HBS data using Goskomstat food composition coefficients) is 15–20 percent lower than per capita consumption derived from food balances. The line entitled "Caloric food intake – Goskomstat HBS with FAO conversion coefficients" shows that use of Goskomstat conversion coefficients accounts for about half of this difference. Certainly, it would be surprising indeed if the "top down" commodity balance method and the "bottom up" survey method coincided. However, with such large differences, it is difficult to say much about the level of caloric consumption with any confidence.

For analysis of the caloric content of Russian food intake it is necessary to specify a minimum dietary energy requirement or caloric "cut-off line" analogous to a poverty line in poverty analysis. Poverty analysis in the Russian Federation uses a "minimum food consumption basket" which is approximately 15 percent higher in calories than the minimum dietary energy requirement determined by FAO/WHO/UNU (2 275 versus 1 970 calories). The Russian

minimum food basket has also been criticized for being closely based on actual (unhealthy) consumption trends among the population. Essentially, a more healthy food consumption basket could be purchased at lower cost (Mroz and Popkin, 1995). Critics answer that the minimal food basket is consistent with the actual consumption habits of the Russian population, and therefore its cost, rather than the cost of a prescribed basket, would more likely lead to actual consumption below nutritional target levels. Recommended average caloric intake and food adequacy lines are always approximations, since the actual caloric requirements of each individual depend on the age, sex, activity level and metabolism, and population-wide minimum requirements are weighted averages based on population structure.

Limitations of the AA survey

The main limitation of the Association Agro Food Security Survey is the lack of a well-specified sampling frame. The survey measures food consumption and attitudes in a sample of families with household cash income around or below the official national poverty line in 11 *oblasts* of the Russian Federation. In the AA survey 81 percent of households and 77 percent of individuals had cash incomes below the target household income level of 3 000 roubles. Re-weighting of data from the AA survey is prevented by lack of information on the number of households and number of individuals below the target income level of 3 000 roubles per month per household in the 11 *oblasts* covered in the survey.[22] The lack of sampling frame prevents drawing firm conclusions about the Russian parent population with regard to indicators of food inadequacy. Conclusions can be drawn only about the sample as a case study in food security in households at or below the poverty line in the Russian Federation.

The AA survey included questions on income category, food production, food consumption and various qualitative judgments about the welfare level and actions of households. Questions on food purchases requested the respondent to list food purchases in an average month during the previous year. Questions on food production requested the respondent to record total production and utilization over the previous crop or calendar year. In Table 10 "cash and plot income" is calculated by adding the midpoints of the cash income category figures to the value of food production for sale and self-consumption and food gifts received minus those given. Local (*oblast*) retail prices were used to

[22] The *oblast*-level statistical committees do not supply such information to Goskomstat.

TABLE 10
Mean income of households and individuals in Association Agro Food Security Survey sample

	Cash incomes roubles/month per household*	Cash and plot incomes roubles/month		Observations	
		Per household	Per capita	Households	Individuals
By HH monthly cash income category					
Less than 200 rubles	100	827	218	28	100
200 – 400 rubles	300	1 754	531	83	272
400 – 600 rubles	500	1 466	596	143	391
600 – 800 rubles	700	1 449	702	267	639
800 – 1 000 rubles	900	1 884	771	375	940
1 000 – 1 500 rubles	1 250	2 123	815	457	1 287
1 500 – 2 000 rubles	1 750	2 854	966	501	1 487
2 000 – 3 000 rubles	2 500	3 132	1 064	510	1 553
Above 3 000 rubles	4 000	5 229	1 498	564	1 960
No answer				35	121
Entire sample	1 913	3 174	1 155	2 963	8 750

*Values represent midpoints of income categories or estimates
Source: Association Agro Food Security Survey, December 2000–January 2001.

value food items in this estimate. This wider income aggregate indicates that, on average, households in the AA survey received just a bit lower than the year 2000 Russian Federation poverty line at 3 174 roubles per household.[15] Table 10 shows the distribution of the AA sample by cash income category.

Comparison of Goskomstat HBS and AA survey estimates

Information from the AA survey case study can be used for two purposes. First, it can be used as a baseline against which to compare Goskomstat income and average food consumption figures. This comparison indicates that HBS estimates likely underestimate in-kind food income of Russian households, particularly in rural areas. Second, the percentage of households unable to meet their dietary energy requirements from this sample also gives a baseline against which to compare Goskomstat consumption figures. If 'x' percent of the AA survey households were unable to meet dietary requirements, this could be viewed as an upper limit for the population as a whole.

[15] The income estimate for households earning above 3 000 roubles in cash income assumed that households in this category in fact earned 4 000 roubles.

Mean income and food consumption

The Goskomstat HBS and the AA survey used slightly different income aggregates (Table 11). In principle, the most complete indicator of household welfare is total resources in the Goskomstat HBS. Russian statistics usually list two income aggregates. Cash income is derived from the HBS expenditure information and adjusted by using macro data from the banking sector. The more inclusive aggregate – total resources – is the sum of gross household incomes, savings and borrowing used during the survey period, the value of food self consumption, subsidies and benefits.[16] The AA survey included an estimate of cash income received directly from the respondent as well as a more complete indicator of household welfare, "cash and plot incomes". Cash and plot incomes includes only cash and in-kind food income, without in-kind subsidies and privileges and dissavings. This is not such a grievous omission, since these two categories accounted for only 5.5 percent of total resources of HBS households in 2000 (Goskomstat, 2001d, p. 73). In the following analysis AA survey cash and plot income and HBS total resources will be treated as equivalent.

As expected, the mean per capita income of households from the AA Survey was considerably lower than that of households surveyed in the Goskomstat HBS (Table 12). The mean cash income of a person in the HBS survey was 1 661 roubles per month, while that from the AA survey was 785 roubles per month. By the more meaningful indicator of welfare, total resources, individuals in the HBS were also better off than those in the AA Survey, though not by as much. In fact, AA survey individuals in rural areas were nearly as well off as those in rural areas from the Russian HBS.

There is a considerable difference between the per capita total resources of urban inhabitants surveyed in the Goskomstat HBS and the AA survey, but a small difference for rural inhabitants. The small size of the difference may indicate that the estimation method of the HBS underestimates an important portion of rural incomes (Table 13). The HBS utilized two-week food consumption diaries to measure food expenditures throughout the year, while the AA survey used the recall method for food production over the preceding crop year with a breakdown of the portion marketed, used for feed, consumed, given as gifts and wasted. Both surveys included self-produced and consumed

[16] For a fuller explanation of measurement problems for assessing poverty in the Russian Federation, see Klugman (1997), Falkingham and Kanji (2000) and Ovcharova (2001).

TABLE 11
Goskomstat HBS and AA Survey income aggregates

Income aggregate	Cash income[1]	In-kind food income[2]	In-kind subsidies and privileges[3]	Dissavings[4]
Goskomstat total Resources	X	X	X	X
AA Survey cash and plot incomes	X	X		

[1] Cash income is estimated from cash expenditures and the change in savings within the survey period.
[2] In-kind food products, self-produced, received as gifts and from other sources, valued at local (*oblast*-level) prices.
[3] Estimate of cash value (per respondent) of subsidies and privileges enjoyed by the household for purchase of goods, services as a result of discounts. This includes non-food in-kind income for employees.
[4] Savings spent during the survey period.
Source: Goskomstat (200td), pp. 132–133; Association Agro Food Security Survey, December 2000–January 2001.

TABLE 12
Mean per capita income in Goskomstat HBS and AA Survey, 2000

Roubles per capita per month	HBS (IV Q 2000)	AA Survey
Cash income		
Total	1 661	785
Urban	1 894	862
Rural	1 028	528
Total resources[1]		
Total	1 899	1 155
Urban	2 098	1 027
Rural	1 360	1 245
Ratio: Total resources to cash income		
Total	1.14	1.47
Urban	1.11	1.19
Rural	1.32	2.36

[1]For AA survey, cash and plot incomes.
Note: The cost of the official minimum monthly consumption basket for the Russian Federation in 2000 was t 234 roubles.
Sources: Goskomstat (200tc), p. 77; Association Agro Food Security Survey, December 2000–January 200t.

food as well as food received as gifts. In both the AA and HBS surveys food expenditures (and income) were valued at local (*oblast*-level) prices.

With a lower income one would expect that the mean caloric consumption of AA survey households would be quite a bit less than the average caloric

TABLE 13
In-kind food income in Goskomstat HBS and AA Survey, 2000

Region	HBS (IV Q 2000)		AA Survey	
	roubles/mo	% of total resources	roubles/mo	% of cash and plot incomes
Total	137	7.2	306	28.0
Urban	86	4.1	182	17.4
Rural	277	20.4	722	57.8

Source: Goskomstat (2001c), p. 77; Association Agro Food Security Survey, December 2000–January 2001.

TABLE 14
Comparison of Goskomstat and Association Agro Food Security Survey mean food consumption figures (kg/capita/year), 2000

Per capita food consumption (kg/year)	Goskomstat HBS	AA Survey
Bread and products	109	105
Potatoes	93	105
Vegetables and melons	82	44
Fruits, berries	27	22
Meat and products	50	50
Milk and dairy products	199	273
Eggs, pieces	202	166
Fish and products	14	12
Sugar and confectionery	30	17
Vegetable oil and other fats	10	9
Total calories (kcal/capita/day)	**2 394**	**2 326**
Adjusted estimate (using FAO food conversion coefficients)	2 617	
Protein (g/capita/day)	62	71
Fat (g/capita/day)	82	88

Source: Association Agro Food Security Survey, December 2000–January 2001

consumption of the Russian population as a whole. In fact, the AA survey sample had an average consumption of only 70 calories less than the average for the Russian Federation for 2000 derived from the HBS (2 326 and 2 394 kcal in Table 14). There are two differences in these figures that make them difficult to compare. First, the AA figures were sampled six months later than those of Goskomstat, in December 2000/January 2001. Without 2001 HBS consumption information, it is not possible to correct for this difference. Second, the HBS survey figures utilize Goskomstat food composition coefficients, while the AA means utilize FAO food composition coefficients. For a proper comparison, the Goskomstat figure can be modified to utilize FAO food conversion

coefficients. In Table 14 the recalculated estimate of total calories using FAO conversion coefficients is shown as the "adjusted estimate", which is about 10 percent higher than the Goskomstat figure. The mean caloric consumption of the Russian population, according to the Goskomstat HBS using FAO food conversion coefficients is 12.5 percent higher than the mean of the AA survey sample. Thus, after adjustment, the AA survey sample had an average consumption of 291 fewer calories than the average for the Russian Federation for 2000 derived from the HBS.

Food consumption of the poor

A comparison of food consumption in poor households in 2000 from the HBS and the AA surveys suggests that the HBS underestimates income from in-kind food sources of the poor. Goskomstat publishes no information on the portion of food-inadequate population in the Russian Federation. However, tables on per capita consumption of food by total resource decile are regularly published (Table 15). According to official Goskomstat HBS figures for 1998–2000, the average consumption of the lowest three deciles of the population (the poorest 30 percent) was below the minimum dietary energy requirements set by FAO/WHO/UNU of 1 970 calories. The average consumption for each of the bottom

TABLE 15
Nutritional content of food consumed, by per capita total resource decile, average 1998–2000

Mean values

Total resource deciles	Lowest	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Ninth	Highest
Protein (grams/capita/day)	29.5	39.6	46.3	52.4	59.0	65.0	70.7	76.2	87.6	108.8
Percentage from animal products	*39.7*	*43.9*	*46.1*	*47.4*	*48.7*	*49.9*	*51.2*	*51.7*	*51.9*	*53.4*
Fat (grams/capita/day)	34.8	49.0	58.7	67.5	76.8	86.2	92.8	101.2	117.6	147.8
Percentage from animal products	*56.2*	*59.0*	*60.3*	*61.1*	*61.9*	*62.5*	*64.4*	*64.3*	*64.2*	*64.9*
Carbohydrates (g/capita/day)	184.8	235.4	269.1	300.0	334.4	362.3	387.4	415.6	478.0	584.5
Percentage from animal products	*3.0*	*3.3*	*3.4*	*3.5*	*3.5*	*3.5*	*3.6*	*3.6*	*3.6*	*3.6*
Calories (kcal/capita/day)	1 174.4	1 546.6	1 796.5	2 024.3	2 273.3	2 494.6	2 676.9	2 888.5	3 333.1	4 118.1
Percentage from animal products	*20.9*	*23.4*	*24.6*	*25.4*	*26.1*	*26.8*	*27.7*	*27.9*	*28.1*	*28.8*

Source: Goskomstat (2001a), pp. 71, 74; Goskomstat (2001b), p. 76.

five deciles was less than the caloric equivalent of the official Goskomstat minimum food basket of 2 275 calories. The fact that in Table 15 the mean per capita caloric equivalent of consumption per day of the lowest three or five total resource deciles falls below a minimum level does not indicate that 30 or 50 percent of the population consumes less than the minimum. Each income decile includes persons with consumption above and below the mean. However, it does indicate that the portion of the population consuming less than 1 970 calories per day is likely to be quite a bit above the FAO estimate of food inadequacy in the Russian Federation (based on commodity balances) of 6 percent – probably between 15 and 25 percent. It is also much higher than estimates of undernutrition derived from anthropometric measures covered in Chapter 4 (less than 10 percent).

Certainly, these estimates of caloric consumption of the poor in the Russian Federation should be viewed with scepticism for a number of reasons. First, they probably underestimate food consumption due to the three biases of the Goskomstat HBS discussed above: the sampling bias towards low-income households, the apparent downward bias of Goskomstat food conversion coefficients and the apparent underestimate of in-kind food expenditure and consumption in the HBS, particularly for rural areas. Second, if the poor in the country actually consumed such low levels of dietary energy, this fact would probably be observed in anthropometric studies. But, as will be seen in Chapter 4, anthropometric studies point more to a malnourished and overnourished population lacking in micronutrients. Estimates of undernutrition in the Russian Federation using anthropometric data are not particularly high. Third, the percentage of people below the (total resources) poverty line (which includes both food and non-food items) was "only" 42 percent in 1999 and 33 percent in 2000 (Goskomstat, 2001d, pp. 42, 43). These estimates imply that 60–70 percent of the population had income exceeding the value of a "minimal" basket of food and non-food goods in these years. It is difficult to reconcile these figures with those indicating that each of the lowest five total resource deciles consumed (on average) less than the "minimal" basket of food. Third, these estimates are not consistent with FAO estimates of the portion of the Russian population with inadequate food intake based on commodity balances (6 percent). Sub-Saharan Africa has food inadequacy levels of 30 percent, and the Russian population shows neither the degree of poverty of that region nor anthropometric results similar to it.

Comparison of the HBS and AA survey results indicates that the HBS most likely underestimates food consumption for low-income households. The AA case study survey shows average caloric consumption quite a bit higher than the Goskomstat HBS figures for the lower total resource quintiles, despite considerably lower average total resources. For instance, the Goskomstat lowest total resource decile in Table 16 covers the poorest 10 percent of the Russian population. In order to make the caloric figure compatible with the AA survey results, it is recalculated using FAO food composition coefficients. But even this figure (1 326) is nearly 700 calories or over 50 percent less than the poorest 10 percent of individuals in the AA survey, who consumed an average of 1 995 calories. The second lowest total resource decile in Table 16 is also quite low compared to AA survey results. After recalculation using FAO food composition coefficients it is 1 738 calories, about 20 percent less than the second decile in the AA survey (2 176 calories). Certainly, the AA survey does not cover the poorest *oblasts* in the Russian Federation. However, the *oblasts* covered in the sample

TABLE 16
Per capita caloric consumption by monthly total resource decile, HBS and AA Surveys, 2000

By per capita monthly total resources[1]	HBS 2000			AA Survey	
	Total resources (roubles/ capita/mo)	Caloric consumption[2] (kcal/capita/ day)	Caloric consumption[3] (kcal/capita/ day)	Total resources (roubles/ capita/mo)	Caloric consumption[3] (kcal/capita/ day)
Lowest decile	425.4	1 190	1 326	222	1 995
Second decile	635.9	1 568	1 738	418	2 176
Third decile	798.1	1 816	2 005	582	1 935
Fourth decile	968.2	2 050	2 260	688	2 273
Fifth decile	1 156.6	2 302	2 529	821	2 191
Sixth decile	1 385.3	2 476	2 718	965	2 280
Seventh decile	1 677.3	2 626	2 876	1 101	2 223
Eighth decile	2 070.5	2 868	3 124	1 317	2 376
Ninth decile	2 593.3	3 109	3 388	1 560	2 551
Highest decile	4 262.5	3 901	4 232	2 935	3 128
All households	1 597.3	2 394	2 619	1 077	2 326

[1] For AA survey, cash and plot incomes.
[2] Using Goskomstat food conversion coefficients.
[3] Using FAO food conversion coefficients.
Sources: Association Agro Food Security Survey, December 2000–January 2001; Goskomstat (2001d), p. 33; Goskomstat (2001b), pp. 46, 76.

are not rich, but rather lower- to middle-income. So it is puzzling why the figures in Table 15 are so low, even when adjusted for different food conversion coefficients.

The likely reason for underestimates of food consumption of poor households in the HBS is underestimation of in-kind food income. The AA survey indicates a higher portion of income received from in-kind sources for all total resource deciles (Table 17). Even taking into account the fact that the AA sample was considerably poorer than the HBS sample, the differences are striking, particularly in the lowest and highest total resource deciles.

TABLE 17
In-kind food income in HBS and AA Surveys by monthly total resource decile, 2000

By per capita monthly total resources[1]	HBS 2000 (% of total resources)	AA survey (% of cash & plot incomes)
Lowest decile	12.7	24.7
Second decile	12.5	18.5
Third decile	12.0	15.5
Fourth decile	11.3	18.0
Fifth decile	10.6	14.0
Sixth decile	9.7	12.9
Seventh decile	8.5	28.6
Eighth decile	7.1	13.5
Ninth decile	6.2	32.6
Highest decile	4.8	52.7
All households	7.9	28.0

[1] For AA survey, cash and plot income.
Sources: Association Agro Food Security Survey, December 2000–January 2001; Goskomstat (2001d), p. 36.

Analysis of the AA survey indicates that raising income among the very poor (defined as the bottom three deciles of the AA survey) would doubtless lower food inadequacy. However, the income of the less poor would have to be raised much more in order to reduce food inadequacy. This implies that the greatest impact for reducing food inadequacy can be achieved from policies that address primarily the poorest. Forty-one percent of individuals in the AA survey case study consumed inadequate levels of food, using the FAO/WHO/UNU minimum dietary energy requirement of 1 970 calories (Table 18).[17] Analysis of food inadequacy by deciles reveals that this indicator does not rise monotonically with income. Instead, food inadequacy drops greatly after the first three income deciles. After the first three deciles, food inadequacy remains nearly constant until the ninth decile, when it again declines. A similar pattern can be discerned in the changes in the depth of food inadequacy indicator as income increases, though not as clearly. The depth of food inadequacy is calculated by comparing

[17] Estimation of the percent of food inadequate population in the AA survey required construction of household-specific minimum dietary energy requirements compatible with a healthy sedentary lifestyle (Box 1).

TABLE 18
Food inadequacy of Russian individuals in AA survey, by per capita cash and plot income decile

Per capita monthly cash and plot income	Mean consumption (kcal/capita/day)	Food inadequate population	
		Percent	Depth of food inadequacy
Lowest decile	1 995	57	535
Second decile	2 176	46	422
Third decile	1 935	64	445
Fourth decile	2 273	38	376
Fifth decile	2 191	46	425
Sixth decile	2 280	38	382
Seventh decile	2 223	43	391
Eighth decile	2 376	41	348
Ninth decile	2 551	29	310
Highest decile	3 128	13	311
All households	2 326	41	407

Source: Association Agro Food Security Survey, December 2000–January 2001

the consumption of a food-inadequate household with its minimum dietary requirement. The depth of food inadequacy gives the average food calorie shortfall of households below the minimum dietary requirement. The percentage of the food inadequate population is the same for a group of households just below the minimum energy requirement and a group far below this line. But the depth of food inadequacy is larger the further households are from the dietary energy requirement. The depth of food inadequacy diminishes with increases in income, though not monotonically.

The prevalence of food inadequacy in the AA survey was 41 percent (Table 18). This is a high figure, to be expected from a survey of poor households, and indicates (if correct) that the households surveyed seem to be in real difficulty. The results of a direct question to family respondents yielded an even higher figure of food insecurity. When household respondents were asked, "Do you consider that your family income is enough for providing your children with quality foodstuffs?", only 14 percent answered yes, 77 percent answered no and 9 percent answered that it was difficult to say. This illustrates that the respondents' subjective perception of either food inadequacy or malnutrition (it is not clear from the question) actually exceeded calculations based on a family-specific food inadequacy line.

BOX 1

Construction of household-specific minimum energy requirements for the Russian Federation

Individuals of different sex and age groups require different levels of dietary energy in order to lead a healthy life. FAO/WHO/UNU publishes an aggregated estimate of the minimum dietary energy requirement compatible with a healthy sedentary lifestyle, based on the structure of the population of the Russian Federation (1 970 kcal/capita/day). However, for survey work, a minimum dietary energy requirement corresponding to the age-sex composition of the household must be calculated. This requires knowledge of minimum dietary energy requirements for each member of the household. These requirements can be estimated using information on the structure of the Russian population and on the relative energy requirements of the different age-sex groups. Russian statistical yearbooks report the age-sex composition of the Russian population using five categories (Table 19). The dietary energy of the official Russian Federation minimum food basket is based on dietary norms for these five categories. Using the population weights and the relative dietary requirements of the Russian norms, an estimate of dietary requirements implicit in the FAO/WHO/UNU aggregate requirement can be made. Note that the FAO/WHO/UNU minimum dietary requirement is uniformly lower than the official minimum food basket used for calculating the Russian poverty line.

TABLE 19

Population structure and estimate of age-sex specific nutrient requirements for the Russian Federation

	Working age		Pensioners	Children		Weighted average
	Men	Women		0–6 yrs	7–15 yrs	
Russian Federation population structure, 1 January 2000						
Population	44 027 342	42 302 883	30 176 196	9 246 471	19 806 316	145 559 208
Population weights	0.30	0.29	0.21	0.06	0.14	1.00
Nutrient levels of the official minimum consumption basket						
Kcal per person per day	2 730	2 110	2 000	1 580	2 360	2 275
Relative requirement	1.20	0.93	0.88	0.69	1.04	1.00
Estimate of individual nutrient levels implicit in FAO/WHO/UNU minimum dietary energy requirement						
Kcal per person per day	2 364	1 827	1 732	1 368	2 044	1 970

Sources: Government of the Russian Federation (2000); Goskomstat (2000b), p. 36.

The reasons for food inadequacy

The reasons for incidence of food inadequacy are considered here according to two determinants of access to food: location and family structure. Location seems to be an important determinant of access to food, because there are a number of remote areas of the Russian Federation (particularly in the north) to which physical access is impaired, thus raising the cost of supplying these regions. Add the transaction costs of delivering food to these regions (referred to in Chapter 2) and it is clear that location should be an important determinant of food access. Second, family structure was found to be a prime risk factor for poverty in the Russian Federation and other transition economies (World Bank, 2000) and therefore deserves separate consideration.

Much of the following analysis relies on analysis of information from the AA survey. These results should be interpreted with care. Without a well-specified sampling frame only qualitative judgments about the poor of the Russian Federation can be made. Absolute estimates using AA survey data do not accurately reflect the situation in the Russian population, but judgments of, for example, whether food inadequacy among the poor is more widespread in urban or rural residents are probably fair when based on AA survey data.

Food inadequacy by location

According to Goskomstat official figures, the *oblasts* subject to lowest food consumption are situated predominantly in the northern and far eastern parts of the Russian Federation not well-endowed with agricultural production (see Box 2). In some years (according to the Goskomstat HBS), the average caloric consumption of some *oblasts* fell below the FAO/WHO/UNU minimum dietary energy requirement of 1 970 calories. However, after correction for low food composition coefficients no *oblast* had average consumption lower than the 1 970 calories in any of the three years.

The fact that average food consumption does not fall below a food adequacy line does not mean that the poor in those regions are not in danger of food inadequacy. Quite low average energy supply for the regions may mean that sizeable proportions of the population consume less than the minimum energy requirement in some years (Figure 10). The figure shows the distribution of Russian *oblasts* by per capita dietary energy consumption calculated from Goskomstat household survey data for 1997, 1998 and 1999 (Goskomstat, 2001a). For most Russian *oblasts*, per capita dietary energy consumption was close to or higher than the sample mean of 2 302 calories. However, there were

BOX 2

Kamchatka *Oblast:* A case study of food insecurity in remote areas of the Russian Federation

Kamchatka is a part of the far eastern and northern territories of the Russian Federation, which combined account for some 42 percent of the national territory, but for only less than 5 percent of its total population. To illustrate the remoteness of Kamchatka, Moscow is about as far from New York as it is from the *oblast* capital, Petropavlovsk Kamchatski. The largest industry in Kamchatka is commercial fishing and fish processing. Seventy percent of the total catch is exported. Kamchatka *oblast* also has significant deposits of minerals such as coal, natural gas and oil, nickel, platinum and gold, but their exploitation has been developed to a very limited extent.

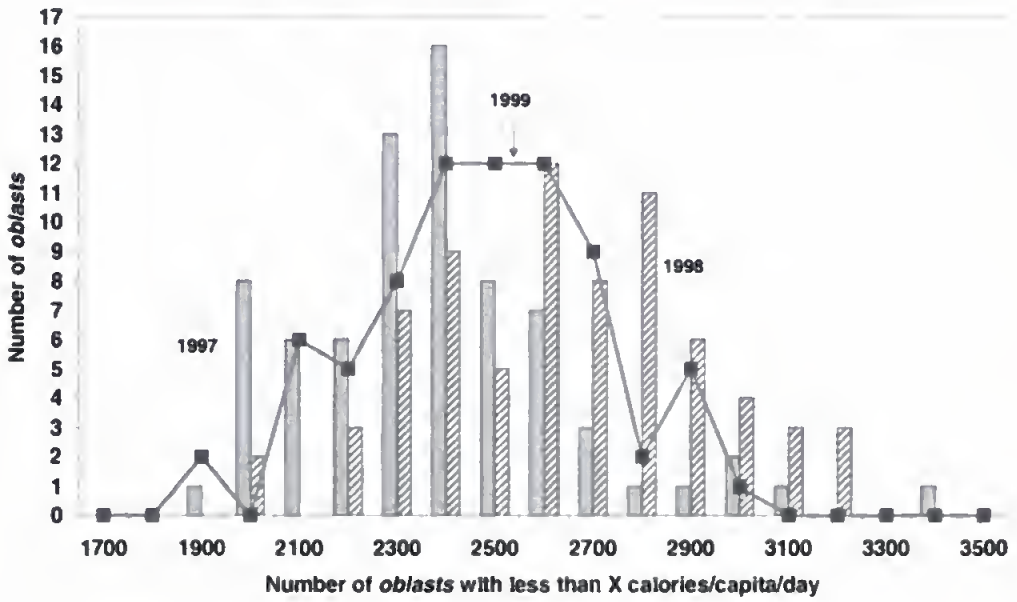
Kamchatka has remote northern areas which have been depressed since the end of Soviet-era producer and consumer subsidies and are now at high risk of food insecurity. Northern rural areas have no significant agricultural production and seasonally limited transport connections with the capital. Such areas cover practically the entire territory of Koryakski avtonomny okrug located in the north of the Kamchatka peninsula, the Commander Islands to the east of Kamchatka in the Pacific Ocean and some locations in the north of Kamchatka *oblast*. The total population in this area is estimated at 35 000. Hunting, fishing and forest foods therefore contribute significantly to household food security. The outreach of humanitarian aid, whether international or provided by the local government, is limited in these areas.

Privatization of food trade has implications for food availability and prices in remote settlements. In Soviet times remote areas were supplied with all necessities for winter during the summer period, when transport is easy. During the long winter period people lived off the stocks built up previously. This was done on the basis of strong logistical planning and availability of resources, both financial and physical. The private traders who are now "in charge of" supplies within the context of the market mechanism face important constraints, including a relative shortage of working capital, implying the need for rapid turnover of funds and risk aversion. Consequently, they cannot fully supply long-lasting stocks of food in low effective demand areas. This results in shortages of basic necessities in remote areas, especially during the winter period, as well as in steep price differentials.

Source: FAO. 2000a.

FIGURE 10

Distribution of Russian *oblasts* by per capita consumption of calories, 1997–1999



Source: Goskomstat (2001a)

also seven *oblasts* in 1997 (Sakha Republic, Magadan, Republic of Komi, Perm, Ingush Republic, Orenburg and Sakhalin) and two in 1999 (Kamchatka and Samara) with per capita dietary energy consumption lower than 1 970 calories. Sakha, Magadan, Komi and Sakhalin (from 1997) and Kamchatka (1999) are examples of far northern and eastern regions. Other regions do not fit this description. Ingushetia (1997) has been greatly affected by military conflict. But there are also two regions (Orenburg and Perm in 1997) that are not disadvantaged in terms of weather conditions or geographic position, but still have very low average supplies of dietary energy.

Perhaps the most robust conclusion that emerges from study of information from the AA survey is that the incidence of food inadequacy among the poor is higher the more urban the settlement type. The larger the settlement, the lower the per capita consumption, the greater the percent of individuals undernourished and the greater the depth of food inadequacy.[18] These conclusions are evident

[18] In *oblasts* with higher urban populations the percent of undernourished individuals is greater. In more rural *oblasts* the percent of food inadequacy is less. The only exceptions to this general pattern are Moscow and Sverdlovsk *oblasts*.

TABLE 20
Food inadequacy of Russian individuals in AA survey, by location

	Mean consumption (kcal/capita/day)	Ratio of food inadequacy in capital city to rural areas (%)	Food inadequate population	
			Percent	Depth of food inadequacy
All household members	2 326		41	407
By settlement type				
Oblast capital	2 079		53	412
Other urban	2 405		36	400
Rural households	2 642		26	398
By *oblast*				
Khabarovsk	2 319	230	46	402
Volgograd	2 567	220	32	392
Leningrad	2 085	450	55	381
Rostov	2 231	240	48	472
Orel	2 537	480	39	404
Omsk	2 304	120	38	427
Novosibirsk	2 380	400	36	380
Nizhnii Novgorod	2 594	1 370	41	480
Moscow	2 256	100	40	378
Kirov	2 795	440	18	241
Sverdlovsk	2 354	90	35	449

Source: Association Agro Food Security Survey, December 2000–January 2001

from a study of Table 20, which shows a number of indicators from the AA Survey concerning food inadequacy by location of Russian individuals. The first data column shows the mean per capita caloric consumption of individuals in the sample. The second column indicates the food inadequacy percentage for the capital city of each *oblast* as a percentage of the same indicator for rural areas. The third column shows the percentage of individuals in the AA survey falling under the household-specific food adequacy line. The next column shows the depth of food inadequacy: by how many calories an average hungry person fell short of the minimum level of calories.

The greater food security of rural areas appears to be connected with the prevalence of private plots and their role as buffers against poverty. Eighty-nine percent of individuals in rural areas, 71 percent of individuals in other urban and only 46 percent of individuals in capital cities had private plots in the AA survey. Private plots were important for all respondents, but were par-

ticularly important for the households with lower incomes (Table 10, Table 12 and Table 13). In households that responded to the question about cash income categories, private plots raised incomes by 66 percent. However, in households in the lowest income category earning less than 200 roubles per month, private plots added more than seven times as much to household incomes as did cash receipts.

Table 21 illustrates that private plot incomes for households in the AA survey by *oblast* were generally more important in the "income from cash and plots" aggregate than in the Goskomstat "total resources" aggregate for the entire population. This is consistent with findings in Table 13 about underestimation of in-kind food income in the HBS, particularly in rural areas.

TABLE 21
In-kind food income in AA survey income and Goskomstat total resources, by location (percent)

Oblast	AA Survey	HBS (Q 4 2000)
Khabarovsk	36	7.3
Volgograd	24	10
Leningrad	3	3.8
Rostov	8	8.5
Orel	37	13.7
Omsk	39	14.1
Novosibirsk	33	13.3
Nizhnii Novgorod	32	7.8
Moscow	16	4.5
Kirov	45	14.1
Sverdlovsk	17	6.8

Sources: Association Agro Food Security Survey, Dec. 2000–Jan. 2001, Goskomstat (2001c), p. 109.

Food inadequacy by family type

In a recent World Bank publication on poverty in Europe and Central Asia children were listed as one of the primary population groups with a higher incidence of poverty than others (World Bank, 2000). It is therefore interesting to see whether children are also an important risk factor for food security. It cannot be said that children particularly are a greater risk factor than other family members, though additional family members do seem to be so.

Household average calorie and protein consumption per capita decline as the number of children increases (Table 22). However, the same is true of any addition to the number of family members in the household (Table 23).

Neither does the AA survey data shed light on the question of whether adding a child to a family increases the risk of food inadequacy. Certainly adding a member to a family seems to increase the risk of food inadequacy. The lowest-risk families are those composed of one member, followed by those with two adults. Additional family members beyond that increase food inadequacy.

BOX 3

Republic of Tyva: Ethnicity and poverty in rural areas

The Republic of Tyva is in eastern Siberia next to the Mongolian border. Access to other Russian regions is through two roads, one of which is often impassable during the winter. Tyva is considered one of the poorest regions in the Russian Federation. According to official statistics, 70 percent of the population receives income under the minimum consumption basket. In 2000, 87 percent of the Tyva republic budget was financed by the Russian federal government.

Rural areas of Tyva are populated nearly entirely by native Tyvans. After the break-up of the Soviet Union a large part of the Russian population left Tyva. Those Russians that stayed live predominantly in the capital, Kyzyl, since poverty is concentrated in the countryside. Native Tyvans usually do not have the option of emigration from the republic, because they do not have friends or relatives in other *oblasts* and they speak little or no Russian.

The traditional occupation of rural Tyvans is itinerant livestock breeding. Eighty percent of agricultural production comes from the livestock sector. Even though Tyvans are native livestock specialists, by and large they do not market their products. Of 45 000 cows in Tyva, only 1 000 are located within a 30 km radius of Kyzyl, even though almost half of Tyva's population lives there. Most milk produced by Tyvan cows is processed into butter, a large loss of potential revenue. This is partly due to the fact that livestock rearing is not considered a real business, but is primarily for self-consumption and barter.

Another lost income opportunity is Tyva's 25 000 ha of irrigated land suitable for vegetable and potato production. This potential source of income is underutilized because native Tyvans prefer livestock breeding. Vegetable and potato prices in Tyva are five times the Russian average and higher than in other Siberian *oblasts* and current vegetable yields reach 8–10 tonnes per ha on irrigated land. But only 780 ha are used for that purpose. In recent years Koreans from Kazakhstan have come to grow vegetables and melons on irrigated land. They have built temporary secondary or tertiary irrigation canals allowing irrigation throughout the growing season, resulting in high yields.

The heavy emphasis on itinerant livestock breeding means that Tyva has a food production pattern highly skewed toward meat production. Potato production in Tyva is one-tenth that of the Russian average, vegetable production is 0.15 that of the Russian average, but meat production is 113 percent of that of the Russian Federation. More importantly, a large portion of meat production is self-consumed or given as gifts, leaving little room for development of a meat export industry in Tyva.

Source: FAO. 2000b.

TABLE 22
Nutritive content of food consumed by households, by number of children, 2000

Number of children in household	1 child	2 children	3 children	4+ children	Hh under poverty line
Protein (grams/capita/day)	54	49	45	38	43
Fat (grams/capita/day)	71	60	50	40	51
Carbohydrates (grams/capita/day)	298	285	276	250	256
Calories (kcal/capita/day)	2 056	1 882	1 740	1 515	1 662

Source: Goskomstat (2001a), pp. 72–73.

TABLE 23
Nutritive content of food consumed by households, by family size, 2000

Household size	All families	1 person	2 people	3 people	4 people	5+ people
Protein (grams/capita/day)	61	102	76	66	52	48
Fat (grams/capita/day)	79	135	100	79	66	58
Carbohydrates (grams/capita/day)	348	627	439	327	291	277
Calories (kcal/capita/day)	2 352	4 142	2 972	2 265	1 975	1 826

Source: Goskomstat (2001a), pp. 72–73.

A model of household food inadequacy

Food inadequacy has many correlates, and it is preferable to address them simultaneously. Only using such an approach can the contributions of location, income and family structure to food inadequacy be separated in quantitative terms. But to follow this approach a model structure must be imposed on the data used, which inevitably complicates the discussion. In the preceding sections the major factors leading to food inadequacy were described, which suggests a model specification to test using AA survey information.

Using data in the AA survey, a test for whether adding children to a family increases the risk of food inadequacy can be constructed. This model must also simultaneously take into account other factors which were found to have been correlated with food inadequacy. These are factors such as location and household income (cash and plot income). It would also be useful to know, in general, which factors are most important in determining whether families are undernourished or not. To answer these questions family-level food inadequacy is modelled using the following explanatory variables, based on the previous discussion:

TABLE 24
Food inadequacy of Russian individuals from AA survey, by household type

Household type	Mean consumption (kcal/capita/day)	Food inadequate population	
		Pct	Depth
All household members	2 326	41	407
Children	2 259	42	415
Pensioners	2 537	28	349
By household type			
2 adults only	2 608	28	380
2 adults no children, with relatives	2 317	43	431
2 adults with 1–2 children only	2 142	48	426
2 adults with 1–2 children and relatives	2 209	45	398
2 adults with 3+ children only	2 128	50	444
2 adults with 3+ children and relatives	2 650	35	287
1 adult only	3 341	16	221
1 adult, no children, relatives	2 099	62	222
1 adult, 1–2 children, no relatives	2 304	34	351
1 adult, 1–2 children, relatives	1 811	41	404
1 adult, 3+ children, no relatives	1 665	73	382
Pensioner family of 1	2 873	19	310

Source: Association Agro Food Security Survey, December 2000–January 2001.

HHINCOME = the monthly family (cash and plot) income
NUMCHILD = the number of children in the family
NUMPENS = the number of pensioners in the family
WKAGE = the number of working-age persons in the family
LOC1 = dummy variable indicating that the household resided in an *oblast* capital
LOC3 = dummy variable indicating that the household resided in a rural area

To model food inadequacy, a dependent variable BELOW is used. BELOW is a 0–1 variable equal to 1 if the total household monthly calories consumed < a household-specific minimum, and equal to 0 otherwise. The variables HHINCOME, NUMCHILD, NUMPENS, WKAGE, LOC1 and LOC3 are used in the binomial logit regression model to explain whether the variable BELOW takes on a value of 0 or 1.

The results of the binomial logit regression are shown in Table 25. The F-test provides a formal hypothesis test of whether all the coefficients are simultaneously equal to zero. This is equivalent to testing the null hypothesis

TABLE 25
Survey binomial logit regression for family-level food inadequacy using AA survey data

F(6, 115) = 22.44			
Prob > F = 0			
Variable name	**Description**	**Coefficient**	**T Stat.**
Dependent variable			
BELOW	1 if undernourished HH, 0 if not		
Independent variables			
HHINCOMEMO	HH total income	0.000	-7.36
NUMCHILD	Number of children in HH	0.585	6.63
NUMPENS	Number of pensioners in HH	0.437	4.03
WKAGE	Number of working age in HH	0.538	8.22
LOC1	Location: *Oblast* capital	0.782	4.86
LOC3	Location: Rural	-0.169	-2.88
CONSTANT	CONSTANT	-1.658	-9.65

Source: Calculations from Association Agro Food Security Survey, December 2000–January 2001

that the fit of the equation is not significantly better than that provided by using the mean of BELOW to predict the value of BELOW. The results of the test are quite good with the probability of F virtually zero. Thus, we should reject the null hypothesis. The T statistics on the coefficients are significant as well.

The signs of the coefficients in Table 25 make sense. The negative sign on HH monthly income indicates that the higher HH income, the less probable it is that the household will be undernourished. The positive signs on the family member variables indicate that the risk of family food inadequacy is increased with an increase in the number of children, pensioners or working age persons. The positive sign on the *oblast* capital dummy indicates that there is a higher risk of food inadequacy (above the default location, other urban areas) for families located in capital cities. The negative sign on the rural dummy indicates that living in a rural area diminishes the probability of food inadequacy.

The coefficients on the variables indicate by how much a 1-unit increase in the variable increases the probability of food inadequacy in the family. Since the value of each coefficient depends on the units used, only values of similar variables can be compared. For instance, comparisons can be made between household member variables and between location variables, but it does not make sense to compare between the household income coefficient and household member coefficients.

TABLE 26
Results of Wald tests to determine statistical differences between coefficients on variables in Table 25

Test	F Value	Prob F>0	Accept?
H0: NUMCHILD=NUMPENS=WKAGE	0.74	0.4770	Accept H0
H0: NUMCHILD=NUMPENS	1.36	0.2461	Accept H0
H0: NUMCHILD=WKAGE	0.2	0.6532	Accept H0
H0: LOC1=LOC3	39.66	0.000	Reject H0

Source: Calculations from Association Agro Food Security Survey, December 2000–January 2001

The regression results indicate that being located in an *oblast* capital raises the probability of food inadequacy more than being located in a rural area diminishes it. They also appear to indicate that raising the number of children in the household increases the probability of food inadequacy slightly more than increasing the number of working age persons (not necessarily all of whom are employed). Raising the number of pensioners in the household by one person seems to affect the probability of food inadequacy least. However, the similarity of the coefficients in Table 25 indicates that we should test formally to determine whether in fact these coefficients are statistically different from each other. For this reason, Wald tests were performed on the family member coefficients, as well as on the location variables (Table 26). The test results illustrate that it is not possible to distinguish statistically between the effect of adding a child, pensioner or working age adult to the family. What matters is the number of family members, not whether they are children, pensioners or working age adults. However, the difference in location coefficients is statistically significant.

Chapter 4
Nutrition and food security

Availability and access are not enough to ensure food security in a country. People need to use food properly in order to provide nutritionally balanced diets, requiring knowledge on the nutritional needs of family members and on healthy diets. Contamination of food with micro-organisms, infectious diseases and inadequate feeding of children prevent proper utilization of food in the body. These factors partly set off the benefits of sufficient access to food and result in undernutrition. Lack of essential minerals and vitamins in the diet causes micronutrient deficiencies, related diseases and disabilities. Overconsumption of dietary energy leads to overweight and obesity. Unbalanced diets, overnutrition and non-nutrition-related factors are held responsible for a variety of chronic diseases, especially cardio-vascular diseases (CVD), which are major burdens in affluent countries.

In the present chapter anthropometric and dietary indicators of undernutrition, malnutrition and overnutrition are considered. Anthropometric data are utilized to identify the nutritional status and the main nutritional concerns of various groups of the population of the Russian Federation. The links between anthropometric indicators and poverty in the country are then considered. The connection between what has been called a "public health crisis" in the Russian Federation – the disturbing drop in life expectancy during the early 1990s – and diets is then investigated. Last, the diets of children and average diets are assessed.

The conclusions of this portion of the study are that in terms of the number of people affected, the main nutritional problems in the Russian Federation are overweight and obesity in adults and various micronutrient deficiencies in both adults and children, including iodine and iron deficiencies. Neither child nor adult undernutrition seems to be a sizeable problem in the Russian Federation. An investigation of nutritional outcomes by income indicates that overweight and obesity among both children and adults dominate findings in every income category. Even in the poorest group investigated, overweight and obesity are far more prevalent than underweight, indicating that undernutrition is a far

lesser problem than overnutrition or malnutrition. This evidence points to the extraordinary significance among the Russian population of "subjective factors" such as dietary preferences and policy. Dietary preferences of the population were shaped by previous Soviet policies of subsidizing livestock product consumption and the erroneous belief that large amounts of calories and animal protein were needed to prevent undernutrition. The high prevalence of overweight and obesity and the health consequences – cardio-vascular disease, breast cancer, etc. – are largely a consequence of these erroneous beliefs and policies of the past.

Nutritional problems cannot be held responsible for the sharp decrease in life expectancy from 1992 and 1994. A considerable increase in alcohol consumption during that period seems to be the single most important cause of rising mortality rates in the early reform period. At the same time, once again, the long-term overall mortality pattern in the Russian Federation is strongly determined by nutritional factors, since it is dominated by cardio-vascular diseases (CVD), which are largely preventable by healthy eating, avoidance of smoking and heavy drinking, and adequate levels of physical activity.

Children's diets in the Russian Federation are strongly influenced by the relatively low rate of infant breastfeeding. Nutritional deficiencies during pregnancy and infancy can raise the risk of chronic diseases in later life. Thus, reducing child malnutrition is in the long run a preventive measure against cardiovascular and other lifestyle-related diseases (Popkin, Richards and Montiero, 1996). Inadequate infant feeding practices, especially the low prevalence of breastfeeding, are hypothesized to cause decreased tolerance for infection and malnutrition in infants. For children 0–6 years, there is evidence of overnutrition, which could explain the high prevalence of overweight among five-year-olds. For older children there is some evidence of undernutrition.

Contrary to the perception of many Russians who experienced some degree of deprivation and insecurity during the reform period (Martinchik, Baturin and Helsing, 1997), no deficits in calorie and macro-nutrient consumption are found on the average during the transition process. The average diet of Russians has even become healthier since 1990 due to decreases in milk, meat and fat consumption and a rising share of starchy staples like bread and potatoes. A further change for the better is hampered by barriers to breastfeeding, poor knowledge of healthy diets, unfavourable food preferences (that emphasize animal products rich in fat and protein rather than fresh fruit and vegetables), false recommendations on dietary intakes as a legacy of the Soviet era and low levels of physical activity (WHO, 2000).

Nutritional status of different subpopulations in the Russian population

The main nutritional problems of the Russian population are stunting in children, micronutrient deficiencies for both adults and children and a high prevalence of overweight and obesity in adults. Most of these conclusions are derived from anthropometric indicators. Anthropometric indicators, derived from body parameters such as a person's height and weight, are based on nutritional outcomes, rather than on adequacy of food intake. They are therefore perhaps a more reliable indicator of bottom-line, nutritional welfare. For children, anthropometric indicators compare height and weight for age to a reference group. Low height for age of a child compared to the reference population is called *stunting* and is presumed to reflect a sustained past episode or episodes of undernutrition. Low weight for age of a child compared to the reference population is called *wasting*, and usually results from weight loss associated with a recent period of starvation or disease. For adults, the individuals in the sample population are classified as underweight (Body Mass Index (BMI) < 18.5), normal (18.5 < BMI < 25), overweight (25 < BMI < 30) or obese (BMI > 30). [19]

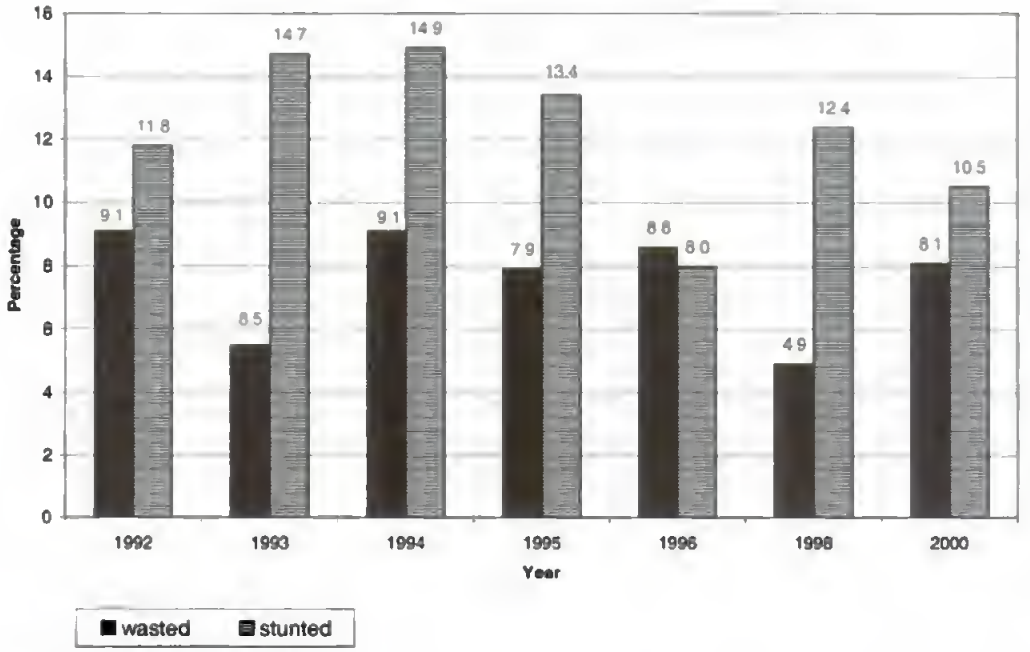
The following sections describe the nutritional status of various groups within the Russian population. Anthropometric indicators are described first, followed by indicators of micronutrient deficiencies. The indicators for the Russian Federation are then put in perspective by comparing them with similar indicators in other countries. The source of most anthropometric information is nationally representative data for children and adults collected in the Russia Longitudinal Monitoring Surveys (RLMS) in the period 1992 to 2000. The RLMS represents the first nationally representative random sample for the country (albeit a highly clustered one). The interview completion rate amounted to 84.3 percent. Further information on the sampling strategy, the survey schedule and the evaluation of samples is posted at http://www.cpc.unc.edu/projects/rlms/project.html.

Children

An important indicator of child malnutrition is the proportion of babies born with low birth weight (LBW). A high proportion of such babies can

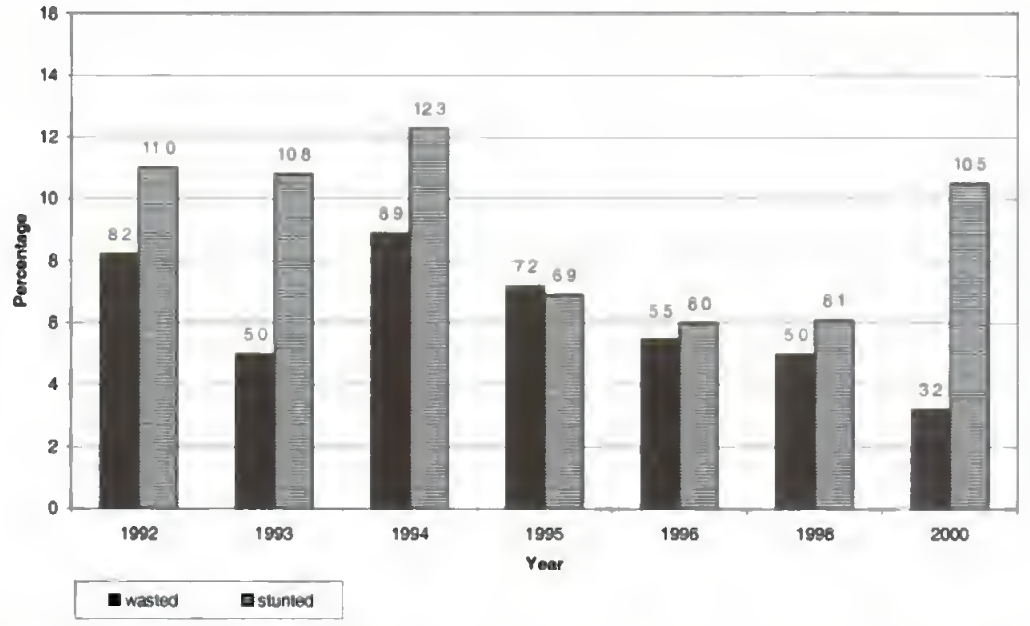
[19] The Body Mass Index is the common measure to classify underweight, overweight and obesity in adults. The BMI relates weight to height: it is calculated as the ratio of weight (in kg) to squared height (in m^2). Underweight in adults is, therefore, not the correlate of underweight in children (which refers weight to age), but rather corresponds to wasting, the anthropometric indicator of low weight relative to height in children.

FIGURE 11
Trends in children's nutritional state (0–24 months)



Source: Zohoori, Gleiter and Popkin (2001).

FIGURE 12
Trends in children's nutritional state (25–72 months)



Source: Zohoori, Gleiter and Popkin (2001).

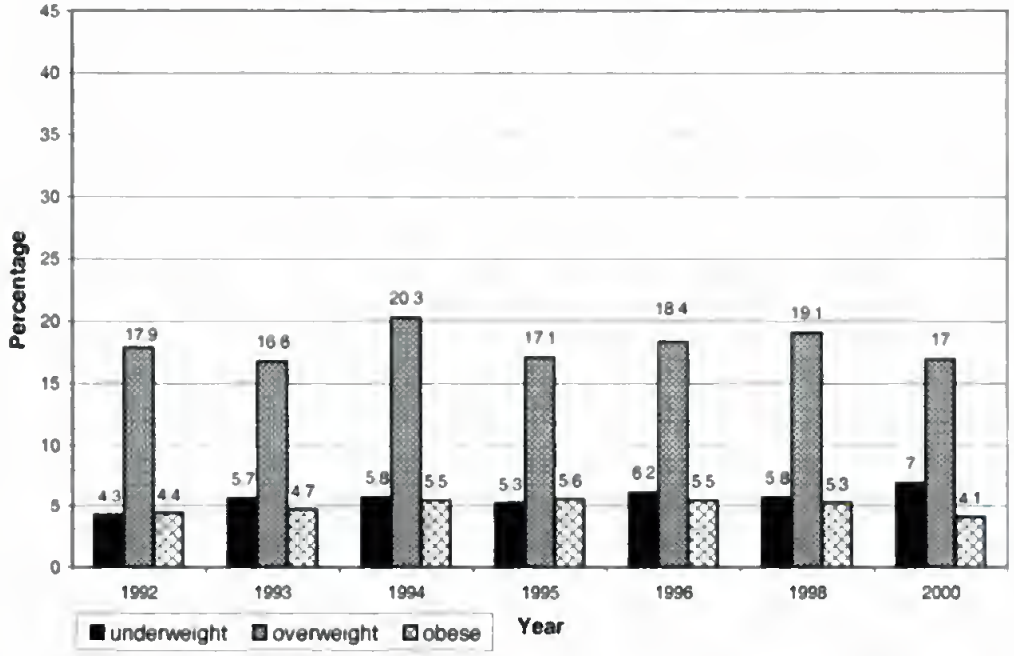
be indicative of nutritional deficiencies during pregnancy. The proportion of babies born with low birth weight (below 2 500 g) in the Russian Federation (7 percent) is not extraordinarily high by world standards. For comparison, the share of low birth weight babies in the countries of the European Union ranges from 4 to 7 percent (UNICEF, 1999). However, low birth weight statistics in the Russian Federation may exclude infants with a birth weight of less than 1 000 g because their chances of survival are so low (WHO 2000b). Thus, Russian LBW statistics may not be comparable to those of European Union countries.

Malnutrition for Russian children seems to begin after birth. Evidence from the RLMS suggests that the prevalence of stunting (low height for age) in the Russian Federation is extraordinarily high among infants (18.6 percent for children up to one year of age in 1995, according to author calculations with data from RLMS 2002) and that stunting is significantly correlated with overweight (Figure 11).[20] Popkin, Richards and Montiero (1996) have found a similar association of stunting and overweight among Chinese, Brazilian, South African and elder Russian children. There are a number of hypotheses for the recent emergence of this pattern in countries undergoing the nutrition transition, yet no solid evidence on the actual causes to date. Given the concomitant prevalence of overweight in the Russian Federation, though, it is more likely that stunting is an outcome of a lack of micronutrients essential for growth and/or frequent infections followed by weight gain during infancy, rather than the consequence of deficiencies in the dietary energy intakes of young children. This reasoning points to problems in infant feeding practices.

For children aged 0 to 2 stunting (the indicator of chronic malnutrition) rose until 1994, then fell and finally rose slightly from 1998 to 2000 (Figure 11) (Zohoori, Gleiter and Popkin, 2001). A decline in income and food expenditure is probably responsible for this trend. In the fall of 2000 incomes were 10 percent lower than in the fall of 1995, and average real food expenditures had dropped to 69 percent of their 1995 level (Mroz, Henderson and Popkin, 2001). The trend for chronic malnutrition in the age group of two to six years is similar to that for younger children (Figure 12), though the upsurge in stunting is not observed before 2000. It is presumed that the rise of stunting in this age group is partly due to the stunted under-two-year-olds of 1998 reaching the upper age

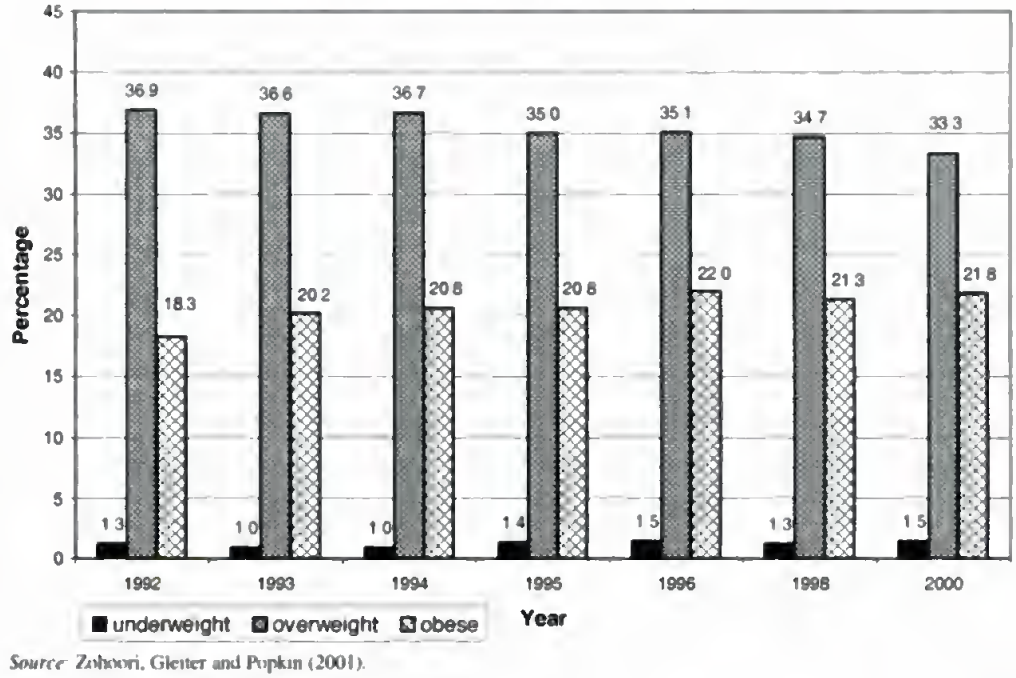
[20] The results for this age group should yet be interpreted with care because of the small number of infants covered in the survey – few children are born in the Russian Federation since the beginning of transition (personal communication with Barry Popkin).

FIGURE 13
Adult nutritional state (18–29 years)



Source: Zohoori, Glenter and Popkin (2001).

FIGURE 14
Adult nutritional state (30–59 years)



Source: Zohoori, Glenter and Popkin (2001).

group by 2000 (Zohoori, Gleiter and Popkin, 2001). No marked differences were found in 2000 for indicators of child malnutrition disaggregated by sex: wasting was higher among girls under seven years of age by 0.3 percentage points, and the share of stunted females exceeded that of stunted males by 0.7 percentage points (author calculation with data from RLMS 2002).

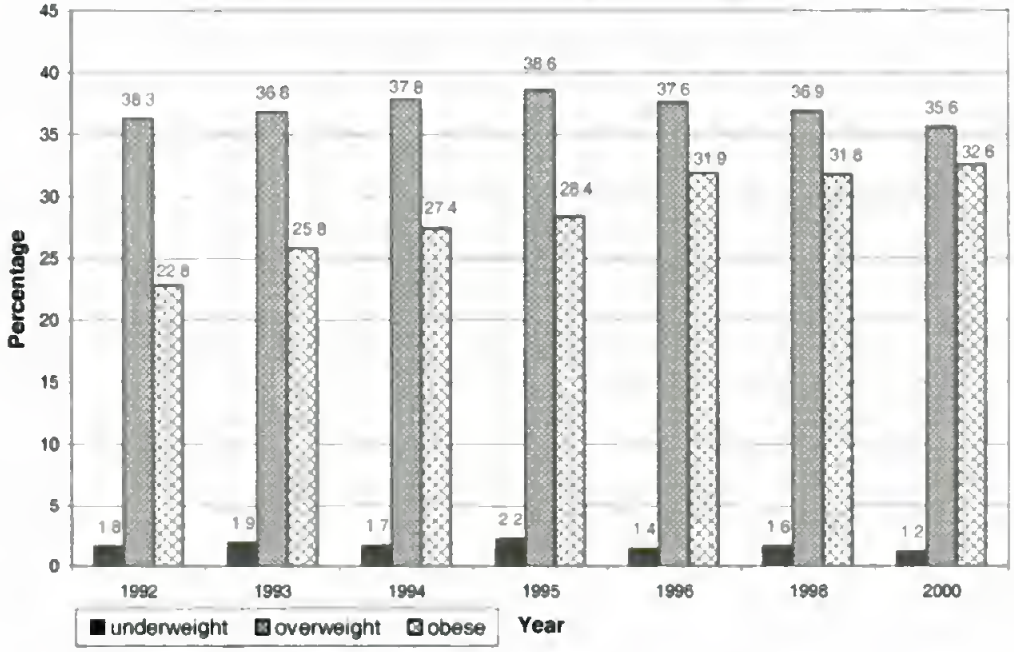
Adults

The main nutritional problems in the Russian Federation for adults are overweight and obesity. Over 50 percent of adults are overweight or obese. These problems can lead to increased morbidity and mortality, particularly from cardio-vascular diseases and cancer. And, in fact, these are the pre-eminent health problems of the adult population in the country. The nutritional status of adults is shown in Figure 13, Figure 14 and Figure 15 by age group. The prevalence of underweight (Body Mass Index (BMI) < 18.5) has steadily increased from 1992 to 2000 in young adults aged 18 to 29 years. The incidence of overweight and obesity was 21.1 percent in young adults. Among middle-age adults (30–59 years), the prevalence of overweight (BMI 25.1–30.0) and obesity (BMI > 30) was alarmingly high. The combined percentage of the two categories amounted to 55.1 percent in 2000. Moreover, a steady shift from the overweight to the obese category is observed. There seems to be little indication of undernutrition in this group, since the prevalence of underweight in adults aged 30 and more years was constantly low.

The most severe problems of overweight were in older Russians, aged 60 and above. The combined percentage of overweight and obese individuals in this age range was 68.2 percent. Moreover, there was a marked rise in obesity from 22.8 percent in 1992 to 32.6 percent in 2000. It is difficult to reconcile this pattern with the stereotype of the elderly as a relatively poor group within the population. In fact, the elderly have traditionally fared better economically than the rest of the population (Zohoori, Gleiter and Popkin, 2001), and the increase in overweight may be connected with the better-off position of this age group, even in the face of generally declining incomes.

There are significant differences in the incidence of underweight and obesity by sex, according to RLMS data. The incidence of underweight in young women is quite high, and that of obesity is quite a bit higher in women. Table 27 shows the proportions of women and men in the underweight, normal weight, overweight and obese categories in 1996. Among young adults, the prevalence of underweight is more than four times higher in females than in males. The

FIGURE 15
Adult nutritional state (60 and more years)



Source: Zohoori, Gletter and Popkin (2001).

slightly elevated prevalence of underweight in this age group as compared to older adults can be traced back to undernutrition of young women. The prevalence of overweight is similar for both sexes, but obesity is found two to almost three times more often in females. Among the elderly, 73.8 percent of women are overweight or obese, but only 53.8 percent of men. The share of individuals with normal body weight is higher among males for all age groups (Baturin, 2001).

TABLE 27
Women's and men's nutritional state in 1996, by age category

Age category	Sex	Underweight (BMI < 18.5)	Normal weight (BMI 18.5–24.9)	Overweight (BMI 25.0–30)	Obese (BMI > 30)
18-29 years	female	8.1	66.2	17	8.7
	male	1.8	76.9	17.8	3.5
30-59 years	female	1.6	33.9	34	30.5
	male	1	51.5	36.3	11.2
60 and more years	female	1.9	24.6	37.9	35.9
	male	2.5	43.6	39.3	14.5

Source: Baturin (2001) (based on RLMS data).

Indicators of micronutrient deficiencies

Nationally representative data of micronutrient deficiencies are scarce, and the Russian Federation is no exception in this respect. Recent studies, however, indicate that the majority of the Russian population (adults and children) is deficient in iodine (up to 70 percent). Micronutrient deficiencies carry significant risks of morbidity and/or premature mortality.

Vitamins

The results of surveys conducted among schoolchildren, teenagers and industrial workers in selected regions of Russia indicate a lowering of the vitamin status during the reform period.[21] Whereas the percentage of schoolchildren with Vitamin C deficiency in Yekaterinburg, Ufa, Norilsk and Yoshkar-Ola amounted to 48 percent in 1983–88, it increased to 63 percent in 1990–93. During the same period, the share of schoolchildren with severe Vitamin C deficiency rose from 2 percent to 23 percent. The percentage of children with a deficiency of the vitamins B1, B2, B6 and B12 in these regions doubled. Surveys carried out among children in Moscow reveal that the prevalence of various vitamin deficiencies was still high towards the end of the 1990s (Table 28). The situation was even worse for students of vocational schools in Yoshkar-Ola in December 1991. Ninety percent of the students suffered from a lack of Vitamin C, with 33 percent having a severe deficiency, and 70–75 percent of students were deficient in the vitamins B1, B2 and carotene (Baturin, 2001).

The vitamin status of adults also gives rise to concern. In the summer of 1990, the percentage of industrial workers in the Urals with severe vitamin C deficiency was 56 percent, a number that increased to 72 percent in 1992. The prevalence of severe Vitamin B1 deficiency among this population group rose from 20 to 56 percent, and that of severe vitamin B2

TABLE 28
Vitamin deficiencies in children in Moscow

Vitamin	Percentage of individuals with vitamin deficiencies among	
	Preschool children in kindergarten 1998–99	Schoolchildren in hospitals 1996–98
A	-	11
carotene	-	75
E	-	25
B_1	64	-
B_2	38	42
B_6	80	65
C	56	8

Source: Baturin (2001).

[21] The figures presented are based on the measurement of vitamin levels in the blood, not on dietary intakes of micronutrients.

TABLE 29
Vitamin deficiencies in the working age population of Moscow

Vitamin	Percentage of working age population with vitamin deficiencies			
	1996	1996–97	1997–98	1998
A	3	0	0	0
carotene	81	100	75	-
E	0	45	44	31
B_2	56	-	68	42
B_6	66	-	44	45
C	13	81	0	-

Source: Baturin (2001).

deficiency from 16 to 38 percent. The severity of vitamin deficiencies is usually higher in winter and spring, but inadequate vitamin status is also widespread during the more favourable summer season, as the above figures indicate. A considerable share of the working age population in Moscow was affected by lack of vitamins in the years 1996–1998 (Table 29) (Baturin, 2001).

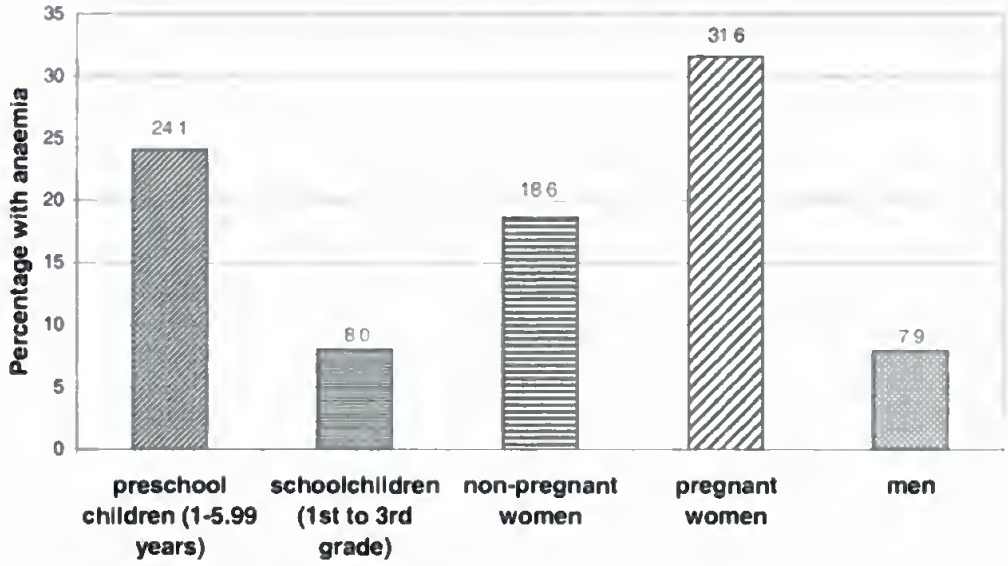
Minerals

Comprehensive data collected about iron deficiency anaemia in the Russian Federation indicate that anaemia is quite prevalent in infants aged six to twelve months and in young women. In surveys conducted in Moscow, Moscow *Oblast*, St. Petersburg and Sverdlovsk *Oblast*, iron deficiency anaemia was diagnosed in 15–47 percent of 6–12-month-old children. In Ivanovo *Oblast*, a relatively high prevalence of anaemia according to the haemoglobin level in the blood was found among children aged one to six years. The results of the survey carried out in autumn 1998 are shown in Figure 16 for different population groups (Baturin, 2001).

In addition to young children, pregnant and lactating women are very vulnerable to iron deficiency (Figure 16). According to official statistics released by the Ministry of Health, anaemia in pregnant women and women in labour has increased significantly in recent years (Figure 17). In 1996, anaemia was diagnosed in 25 percent of pregnant women and over 30 percent of pregnant women in the third trimester of pregnancy.[22] There has also been a marked increase of women in maternity clinics treated for anaemia as a

[22] In general, the prevalence of anaemia peaks in the third trimester of pregnancy.

FIGURE 16
Prevalence of iron deficiency anaemia in Ivanovo *Oblast*, by population group, 1998



Source. Author presentation based on data from Baturin (2001)

postnatal complication (Figure 17). A slight rise from 2.7 percent to 6.5 percent took place between 1985 and 1990, followed by a dramatic increase to 23.1 percent in 1996 (Baturin, 2001).

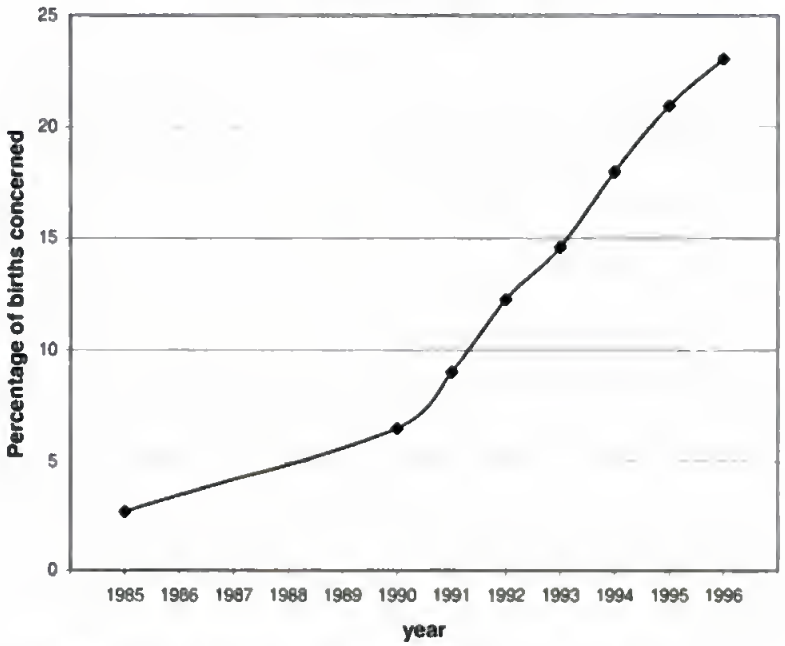
Comparison with nutritional indicators in other countries

Stunting in infants and overweight in adults in Russia are quite high by world standards (Figure 18 and Figure 19). The incidence of stunting in infants is not only high compared to its incidence in older children, but compared to other countries. Likewise, the incidence in the Russian Federation of overweight is not only high compared with underweight, but also in international comparison.

For an international comparison of wasting and stunting prevalence in children, all countries in transition for which anthropometric data are available were selected together with the United States (as a representative of western industrialized nations[23]) and some developing countries. Developing countries with the worst child anthropometric indicators, and poor performance in food security and nutrition in general, were chosen to represent the lower boundary of

[23] Data for industrialized countries are very scarce, since there is obviously no need for extensive monitoring of undernutrition in children.

FIGURE 17
Share of women in maternity clinics treated for postnatal anaemia in the period 1985–1996



Source: Author presentation based on data from Russian Ministry of Health 1996 (from Baturin, 2001).

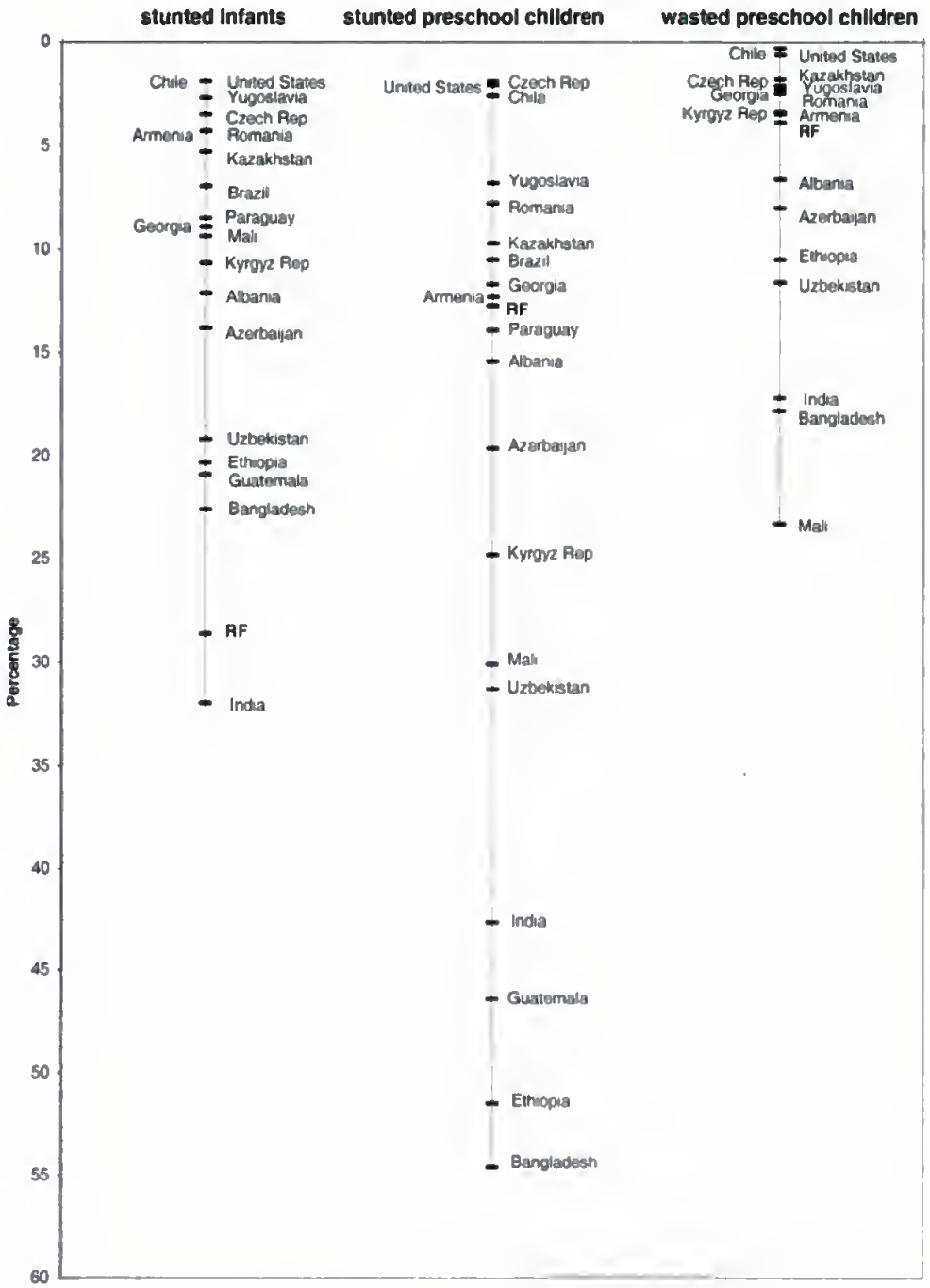
child undernutrition. Additionally, a few developing countries that are relatively well off and show similar or more favourable wasting and stunting prevalence rates than the Russian Federation were also included (Figure 18).

The most likely reason for the comparatively high incidence of stunting in infants is a "weaning crisis", an outcome of improper complementary feeding during infancy and associated health problems. Generally, infants' nutritional status is protected by breastfeeding. Stunting usually peaks either in the age group of one- to two-year-olds or rises successively up to age five or beyond.[24] The pattern in the Russian Federation is obviously quite different, which suggests examination of infant feeding practices and health problems. The opportunities for such an investigation are limited due to lack of comprehensive and nationally representative studies of infant feeding. The Czech Republic is the only country beside the Russian Federation in the selected country set

[24] For example, the maximum share of stunted children is reached at the age of one to two years in Azerbaijan, amounting to 33.9 percent in 2000. The prevalence of stunting among Bangladeshi children under five tends to rise gradually and was 64.9 percent in four-year-olds in 1996/97.

FIGURE 18

Prevalence of stunting and wasting in preschool children in selected countries (data from period 1990–2000)



Source Author presentation based on data from WHO (2002). Note: RF = Russian Federation

with the share of stunted infants exceeding the prevalence of stunting in the total group of under-five-year-olds. Yet the difference of prevalence rates in the Czech Republic between infants and pre-schoolers is only 1.6 percentage points, whereas it is 9.0 percentage points in the Russian Federation.

Russian pre-school children are also at a high risk for wasting (low weight for height). The Russian Federation is ranked at the upper end of the spectrum.[25] Whereas some other countries in transition have a lower prevalence of wasting (Kazakhstan, the Czech Republic, former Yugoslavia, Georgia, Romania, the Kyrgyz Republic and Armenia), the situation is worse in Albania, Azerbaijan and Uzbekistan.

Perhaps the most striking ranking of the Russian Federation in world comparison is that for underweight and overweight (Figure 19). In 1993 the country had a lower incidence of underweight population than even some Western European countries – the United Kingdom and Sweden – let alone developing countries such as China and India. But the incidence of overweight was one of the highest in the world: higher than in the United Kingdom which has significantly higher income per capita.

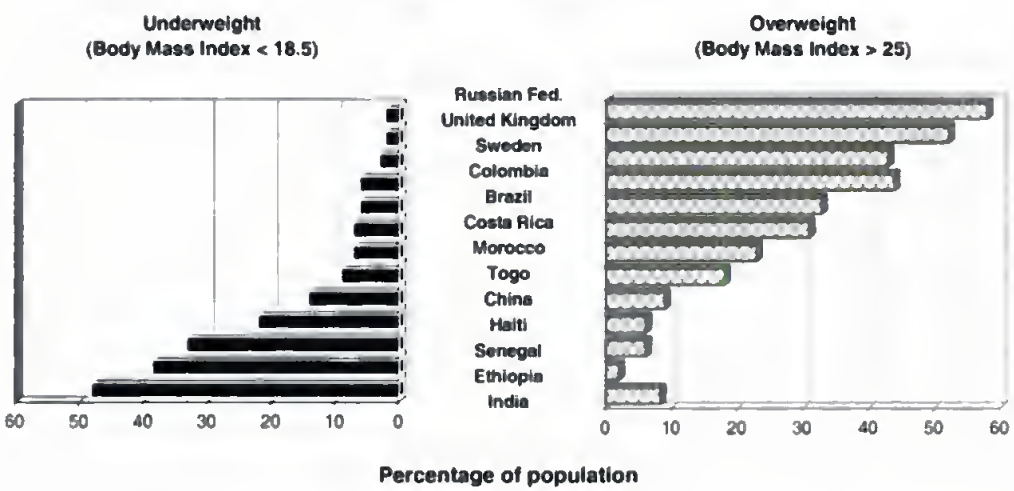
The world ranking of the Russian Federation in regard to mineral deficiencies seems to be worse for iodine deficiency than for anaemia (iron deficiency). Lack of iodine is the second most prevalent micronutrient deficiency in the world, affecting about one-third of the world population (WHO/UNICEF/ICCIDD, 1999). The exact prevalence in the Russian Federation is not known, yet the majority of the population (up to 70 percent) is supposed to be subject to iodine deficiency. Iron deficiency anaemia is a matter of concern for more than half of the world population (UNICEF/UNU/WHO/MI, 1999). Taking anaemia in pregnant women as a yardstick, the Russian Federation is still quite well off with a prevalence of 25 percent. In India, for example, 88 percent of pregnant women suffer from anaemia. In contrast, Poland is at the opposite end of the spectrum with a prevalence rate of 16 percent (World Bank, 1997). In the European Union, about 22 percent of pregnant women are anaemic (WHO, 2000a).

Anthropometric indicators and poverty

Food insecurity and poverty are usually closely related. It was shown in the last chapter that the probability of family undernutrition is highly correlated with

[25] Due to lack of space, some developing countries were omitted from the wasting category in Figure 18 (Paraguay, Brazil, Guatemala with prevalence of 0.3, 2.3 and 2.5 percent, respectively).

FIGURE 19
Percentage of population overweight and underweight in selected countries (1993)

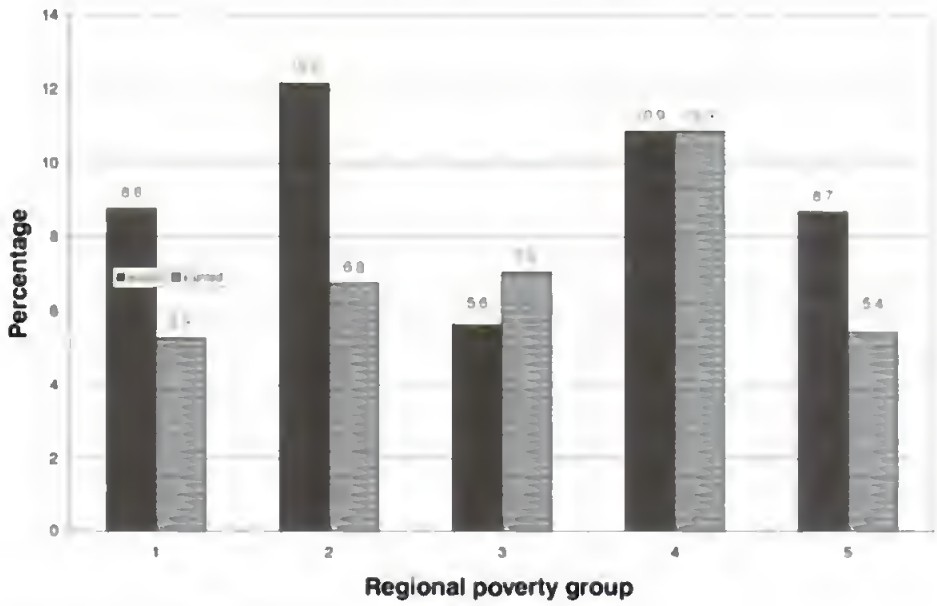


Source: WHO (1998b)

total income in the Russian Federation. What about anthropometric indicators of food insecurity? A number of cross-country studies have established a significant correlation between indicators of undernutrition and per capita or per household income. Anthropometric outcomes of both children and adults are expected to be influenced by the level of family income in a number of ways. First, absolute poverty is likely to prevent people from disposing of sufficient amounts of food, either from purchases on the market or home production. Second, anthropometric status is not only an outcome of food intake, but also determined by health status. Poor health may depress appetite and impede children's growth, and acute infections frequently result in wasting. A family's ability to seek health care in the case of illness depends on its financial resources. Third, family income is expected to be related to living conditions, with poor families living in less healthy environments (with respect to sanitation, safe water and housing) and thus being more exposed to pathogens.

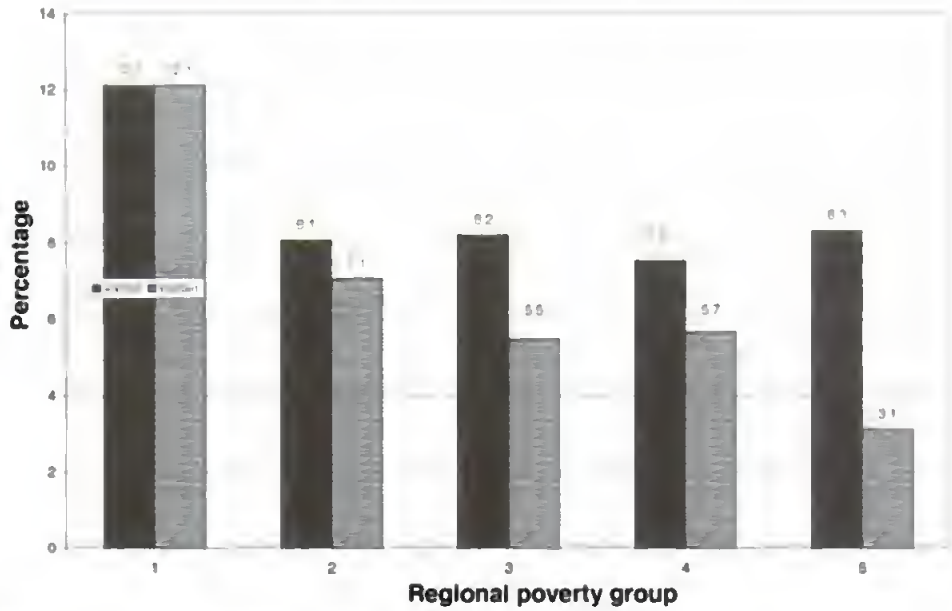
RLMS anthropometric data for 727 children up to seven years and 8 217 adults aged 18 years and over (RLMS, 2002) indicate very little correlation between income and underweight in the Russian Federation, except for boys aged 0 to 7. The same data show a fairly strong correlation between overweight and income group. The incidence of overweight rises with income levels. The surprising lack of correlation for underweight could be explained by less

FIGURE 20
Nutritional state of girls, by poverty group



Source: Author's calculations using RLMS (2002)

FIGURE 21
Nutritional state of boys, by poverty group



Source: Author's calculations using RLMS (2002)

divergence within the Russian population in sanitation conditions, access to safe water, basic medical care, food intake and housing conditions than in developing and developed countries.

Children

Children are more vulnerable to nutritional deficiencies, infectious diseases and poor living conditions than adults. Stunting in particular as an indicator of poor growth is supposed to be closely correlated to poverty, and this form of child undernutrition gives rise to concern in the Russian Federation. Figure 20 and Figure 21 show girls' and boys' nutritional status by poverty group; the first two groups are classified as poor, the latter three as non-poor.[26] Poverty and anthropometric outcomes seem relatively unrelated for girls, since there are high prevalence rates of stunting and wasting in group 4 from relatively well-off families. For some unknown reason, a quite high share of girls in group 4 (4.3 percent as compared to 0 percent in the other groups) is both wasted and stunted.

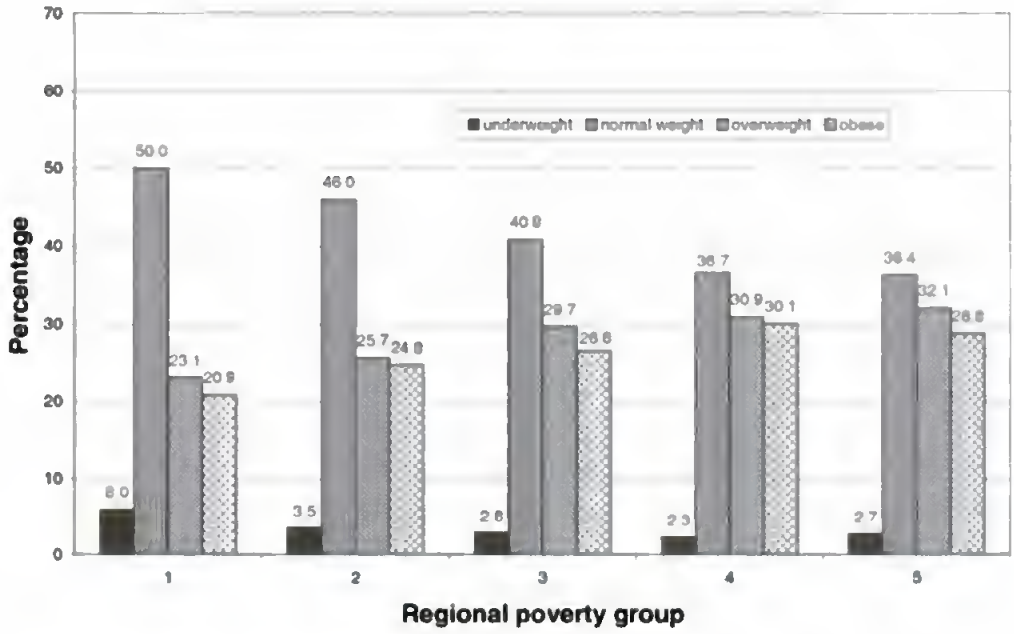
The picture for boys is closer to the expected, particularly with respect to stunting. Among boys in the poorest families, 12.1 percent are stunted, but only 3.1 percent of male children in the wealthiest group are stunted. The association of poverty level and wasting is less clear, yet this is not surprising, since the weight-for-height indicator for children reacts more quickly to short-term changes such as infections. Thus, it may be more confounded by conditions that are not adequately captured in the survey data.

Adults

Undernutrition in adults is not very prevalent (see Figures 13, 14 and 15 and the international comparison in Figure 19). Yet, poverty has been hypothesized to cause underweight among adults. Economic inequality is supposed to have increased during the reform process, raising concerns about a possible deterioration of nutritional status among the poor. There is indeed a slight tendency of decreasing underweight from the poorest to the wealthiest group, especially among females (Figure 22 and Figure 23). However, the declining share of adults with normal body weight and the considerable rise in overweight and obesity among women with rising incomes is quite a bit more pronounced.

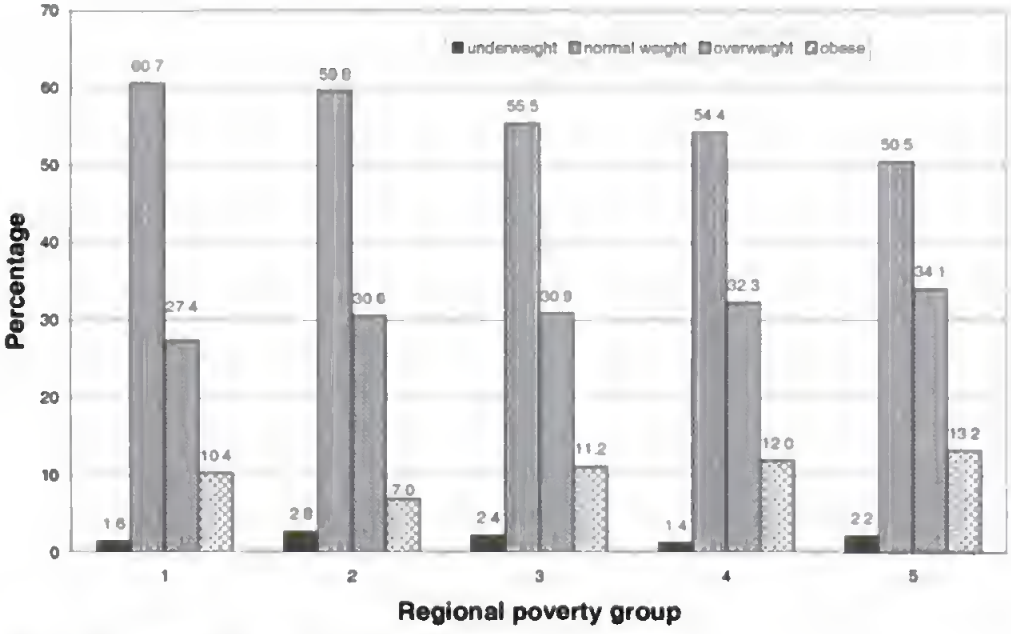
[26] The groups do not constitute quintiles, since they contain different numbers of cases. The grouping is based on regional poverty thresholds.

FIGURE 22
Nutritional state of women, by poverty group



Source: Author's calculations using RLMS (2002).

FIGURE 23
Nutritional state of men, by poverty group



Source: Author's calculations using RLMS (2002).

Overnutrition according to the BMI measure is obviously not only a problem of the wealthier segments of the population, but also affects the poor to a considerable extent, much more than undernutrition. It is the magnitude that increases with gains in income. The correlation of age with total income per household member may contribute to this appearance, since overweight and obesity are most prevalent among the elderly, who are better off in economic terms than younger people.

Public health and diet in the Russian Federation

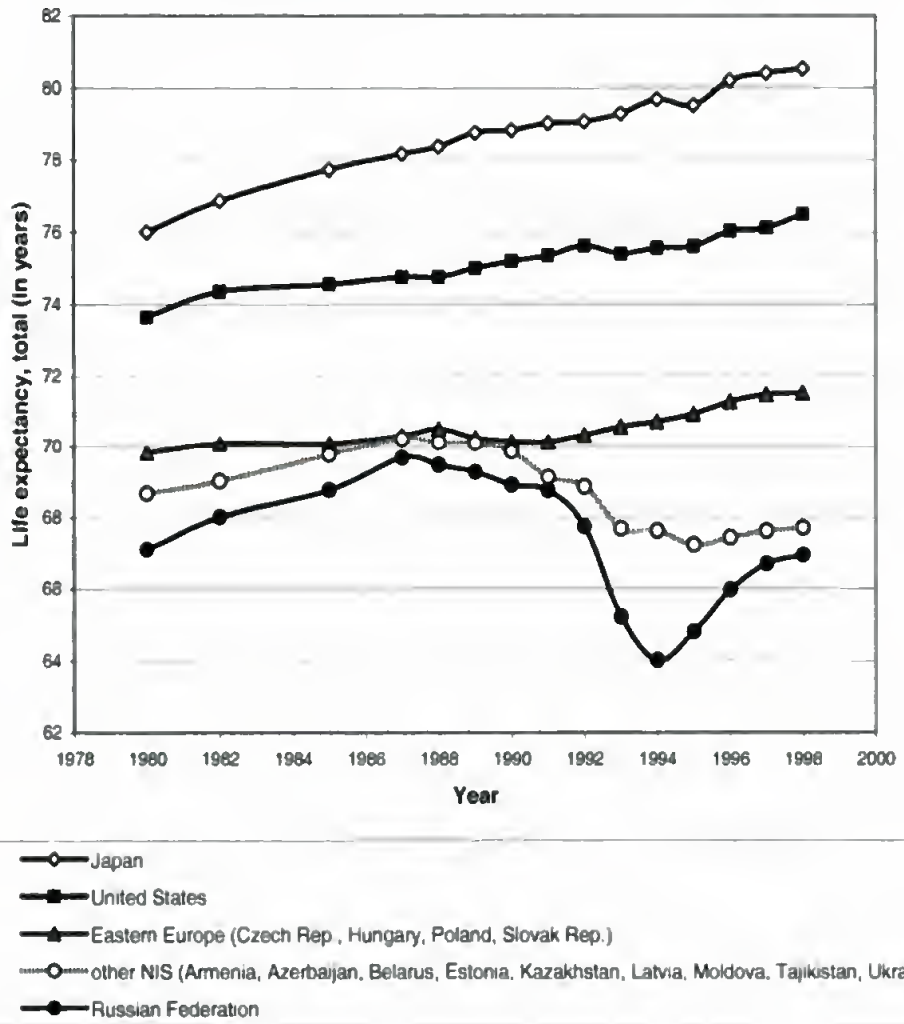
In contrast to Japan, the United States, the European Union, eastern Europe and other developed countries, a marked reduction in life expectancy was observed in the Russian Federation and other successor states of the Soviet Union in the 1990s (Figure 24). This is a unique phenomenon in major industrial nations to date. By 1998, three years of average life expectancy had been regained as compared to 1994, yet the figure was still about two years below the highest level achieved in the Soviet period (in 1987).

A number of explanations have been proposed for the shortening of life expectancy: increased alcohol consumption, food consumption/dietary intake, and the social and economic stratification of the population during the reform process (WHO, 2000a). The balance of evidence cited in the following discussion suggests that the main reason for the decline in life expectancy was an increase in mortality, particularly between 1986 and 1994 and particularly for adults. The primary causes of this increase in mortality were increases in deaths from "external causes" (e.g. accidents, poisoning, homicide and suicide) and from cardio-vascular diseases (CVD). Increased alcohol consumption over this period seems to have been a prime cause of deaths via these two avenues (WHO, 1999). Additionally, the Russian population was subjected to higher levels of stress during the end of the Soviet period and early transition years, a non-nutritional risk factor of hypertension and myocardial infarction. The difficulty of the period is underlined by increases in the numbers of people diagnosed for the first time with mental disorders from 1992 to 1994 (WHO, 1999).

Though the mortality crisis of the early nineties cannot be attributed to food consumption patterns and nutritional state, the death rates from circulatory diseases standardized for age in the Russian Federation are quite high compared with other countries. Food consumption patterns and nutritional state definitely are primary causes of elevated mortality rates from CVD, since obesity and overweight make it more likely that CVD will result in death. In other words,

FIGURE 24

Life expectancy in the Russian Federation, other NIS, four eastern European countries, Japan and the United States (1980–98)



Source Author presentation based on data from World Bank (2000)

though the sudden decrease in life expectancy of the early 1990s cannot be attributed to nutritional state as an immediate cause, the Russian population, because of its risky nutritional state – with high rates of overweight and obesity and high prevalence of hypertension among adults – is more likely to die once CVD is diagnosed than the population in most other countries. Primary reasons for this risky state are overnutrition and lack of exercise, perhaps combined with lower levels of medical care.

Nutrition and health

In order to better understand the role of nutrition in disease outcomes, it may be helpful to review some of the chief diseases associated with dietary deficiencies or excesses (Table 30). Practically every organ and system in the human body depends on nutrition for its normal functioning. Both inadequate and excessive intakes of nutrients are harmful to health, and the paths of disease causation are manifold.

Whereas lack of micronutrients is associated with specific deficiency diseases, other health problems like obesity are solely caused by excess dietary intakes relative to requirements. The list of diseases arising from excessive alcohol consumption is necessarily incomplete, as alcohol can damage almost every organ due to its toxic metabolism, and may also cause micronutrient deficiencies. Hypertension, obesity, and diabetes mellitus are caused by, or

TABLE 30
Effects of nutrition on human health

Nutritional deficiency	Associated disease	Nutritional excess
deficiency diseases		
iron, folic acid	anaemia	
iodine	goitre	
calcium, fluoride	osteoporosis	
vitamin D	osteomalacia	
diseases caused by deficient and/or excess intakes		
potassium, calcium	hypertension	salt, fat, alcohol
	(risk factor for heart disease)	
fluoride	dental caries	sugars
unsaturated fats, antioxidant vitamins	heart disease	saturated fats, cholesterol
vitamin C (?)	stomach cancer	salt (?)
fibre	colon cancer	fat, meat
diseases caused by excess intakes		
	obesity (risk factor for hypertension, heart disease, diabetes, gallstones, arthritis)	dietary energy, sugars, fat, alcohol
	breast cancer	fat
	liver disease, poisoning, alcoholic psychosis	alcohol

Source: Adapted from WHO (2000a)

at least influenced by, nutritional excess, and all three are independent risk factors for heart disease. High blood levels of lipids further increase the risk of atherosclerosis and consequently cardiovascular and cerebrovascular diseases (e.g. myocardial infarction and other ischemic heart diseases, stroke). Yet there is a range of nutrients that are supposed to exert a protective effect on the circulatory system: unsaturated fatty acids and antioxidants in vegetables and fruit, including vitamins C and E. This means, however, that excess intakes of saturated fats are even more harmful in the presence of deficiencies of protective substances. In addition, recent research has revealed that foetal undernutrition and micro-nutrient deficiencies during pregnancy are not only risk factors of low birth weight and birth defects, but may induce obesity and a range of adverse hormonal changes in later life. Nutritional deficiencies during pregnancy and infancy increase the susceptibility to a variety of chronic diseases in adulthood, such as diabetes and cardio-vascular diseases (Popkin, Richards and Montiero, 1996).

Trends and determinants of mortality patterns

The peculiar pattern of decline and then increase in life expectancy of Figure 24 must be associated with an increase and then decline in mortality rates for one or more segments of the population. Moreover, to understand whether the mortality change is connected with diet, changes in mortality from the main causes of death must be considered. Table 30 can assist in understanding which diseases (causes of death) are associated with dietary deficiencies or excesses.

Mortality rates for infants and children do not follow the required pattern of rise and then fall. For this reason, it is doubtful that changes in infant and child mortality are associated with the changes in life expectancy of Figure 24. Moreover, the changes in infant and child mortality do not follow a similar pattern to the trend in child undernutrition (stunting and wasting). The survival chances of infants have continuously improved in the Russian Federation during the last ten years, and the mortality rate for children aged 0–14 years fell from 1987 to 1997 (WHO, 1999). At least in this crude aggregate consideration, there is no association of the peak in child malnutrition in 1994 (compare Figure 11 and Figure 12) and infant mortality. The negative trend in child undernutrition during the years 1992–1994, then, cannot explain the decline of life expectancy.

For the Russian population aged 0–64 years, CVD, "external causes" (e.g. accidents, poisoning, homicide and suicide) and cancer – listed in order of

importance – are the major killers. In 1998, these three categories accounted for 78.3 percent of total mortality in the respective age group.[27] Other causes of death such as infectious and parasitic diseases (including tuberculosis, diphtheria and sexually transmitted diseases) play only a minor role in comparison to chronic life-style related diseases: they accounted for only 3.1 percent of deaths among 0–64 year-olds and for 0.3 percent of deaths among the elderly in 1998 (WHO, 1999). Moreover, the pattern of changes in mortality from infectious and parasitic diseases does not fit the pattern in Figure 24. Mortality from infectious and parasitic diseases almost doubled during the period 1991–1996 according to age-standardized death rates (SDR) (WHO, 1999). The rise of underweight prevalence among young adults may have contributed to this trend, but it is doubtful that the significant changes in life expectancy in Figure 24 can be attributed to the rise in mortality from infectious and parasitic diseases, since 97 percent of deaths were due to other reasons.

Careful study of the three main causes of mortality in the Russian population indicates that cardio-vascular disease and external causes are the most likely causes of the fall in life expectancy observed in Figure 24. Mortality from cancer was only very slightly elevated in 1994 as compared to the beginning of the 1980s and declined again from 1995 on (WHO, 1999). Thus, the sharp fall in life expectancy cannot be mainly attributed to deaths from cancer and nutrition-related causes of cancer. In contrast, the trends in mortality from cardiovascular diseases and external causes developed nearly in parallel since 1984 and show a marked peak in 1994, when life expectancy reached its lowest point. The age-standardized death rate from CVD was almost twice as high in 1994 as in 1986, and mortality from external causes more than doubled during the seven years following 1987. From 1995 on, the negative trend in both mortality rates was reversed (WHO, 1999).

There is a strong association of mortality from external causes and variations in alcohol consumption and no reason to suspect a link with food consumption. Alcohol abuse, then, is quite likely an important cause of the decline in life expectancy in Figure 24. An initial decline of mortality from external causes followed President Gorbachev's anti-alcohol campaign in 1985–1986. After the bans introduced during the campaign were lifted in 1987, alcohol consumption increased sharply, and mortality rates from external causes gradually rose until

[27] Among the elderly aged sixty-five years and over, the share of the three main causes of death was even 85.6 percent.

1992. From 1992 to 1994, the situation worsened due to the negative impact of the reform process while alcohol prices increased much more slowly than the prices of other consumer goods, including foodstuffs (WHO, 1999). According to data collected in the RLMS, the per capita alcohol consumption of adult males increased by 50 percent from 1992 to 1994, and then declined again by 1998 to the level in the first survey round (Zohoori, Gleiter and Popkin, 2001).[28] From 1988 to 1994, the incidence of alcoholic psychosis increased ten-fold, but fell by 34 percent from 1994 to 1997.

The role of high alcohol intakes in cases of injury and poisoning is underscored by the fact that the share of alcohol poisoning in deaths from external causes was 12.5 percent in 1995 and exceeded the proportion of traffic accidents (11.1 percent). A significant number of accidents of undetermined cause, accidental falls, drowning and other accidents (41 percent of deaths from external causes) were also related to alcohol consumption. The age-standardized death rates (SDRs) from homicide, suicide and self-inflicted injury accounted for one-third of the total SDR from external causes in 1997. They followed the same trend as the total mortality rate from external causes, with the lowest level reached in 1986 towards the end of the anti-alcohol campaign, and a considerable peak in 1994, when alcohol consumption reached its maximum (WHO, 1999).

Changes in alcohol consumption are a major reason for changes in mortality from cardio-vascular diseases as well (WHO, 1999). This is quite plausible, because alcohol abuse tends to increase hypertension and induce a high concentration of triglycerides (fats) in the blood, which are both risk factors of cardiovascular diseases. Moreover, between 1984 and 1998, mortality from CVD follows exactly the same trend as total mortality from external causes, suicide and homicide, with the lowest level reached in 1986 and a subsequent steep rise until 1994.

Additionally, the Russian population seems to have undergone considerable distress during the early transition period, which is a non-nutritional risk factor of hypertension and myocardial infarction. Apart from augmented drinking and substance abuse, the rapid increases in the numbers of people diagnosed for the first time with mental disorders from 1992 to 1994 point to the climate of insecurity during the social and economic upheaval (WHO, 1999). In 1994,

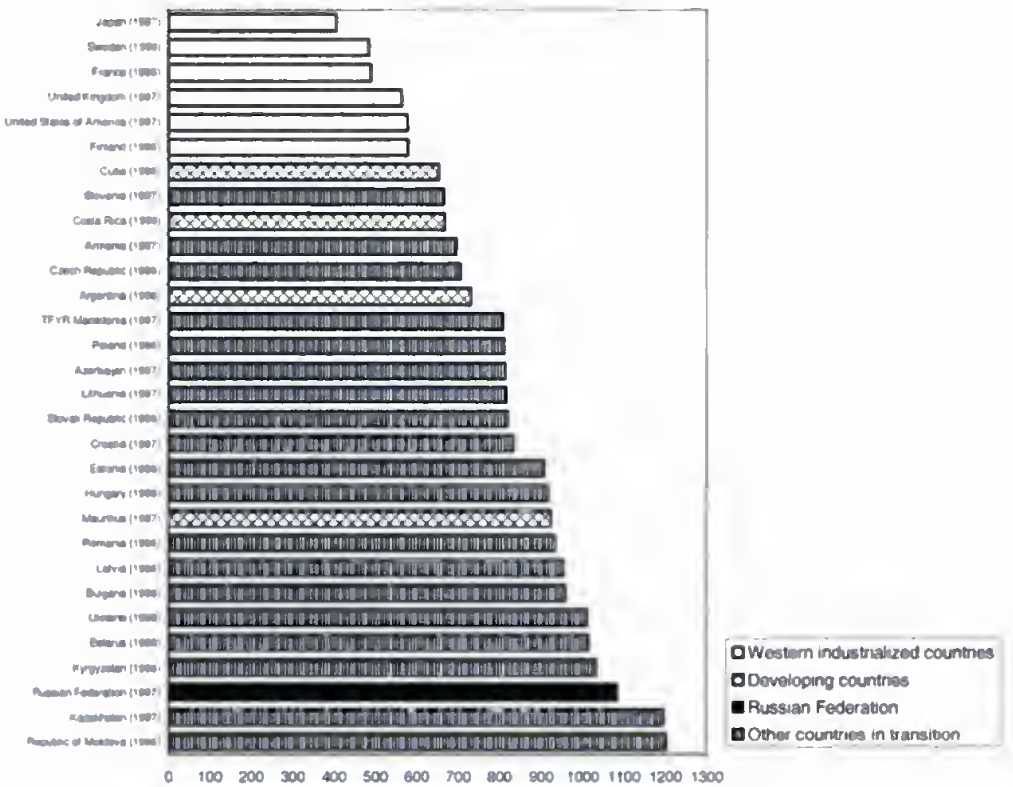
[28] According to RLMS data, men consumed four to nine times more alcohol than women in the period 1992 to 2000. The male mortality rate from external causes is 4.4 times that among females, and SDR for suicide is 6.3 higher among men than among women.

there was not only a health crisis as evidenced from the peak in mortality rates and the unprecedented fall in life expectancy, but the first period of hyperinflation in the Russian Federation in the 1990s (Mroz, Henderson and Popkin, 2001; Popkin, Zohoori and Baturin, 1996).

Whereas the changes in mortality from CVD since the mid-1980s are unlikely to have arisen from altered food consumption patterns and nutritional status, death rates from circulatory diseases standardized for age in the Russian Federation are quite high compared with other countries. WHO provides comprehensive statistics on SDR by causes of death for 46 countries, including western industrialized countries, 20 countries in transition and four quite advanced developing countries (WHO, 1999). The bottom nine places from all causes according to the SDR are held by countries in transition, including the Russian Federation (Figure 25), and almost the same picture emerges for

FIGURE 25

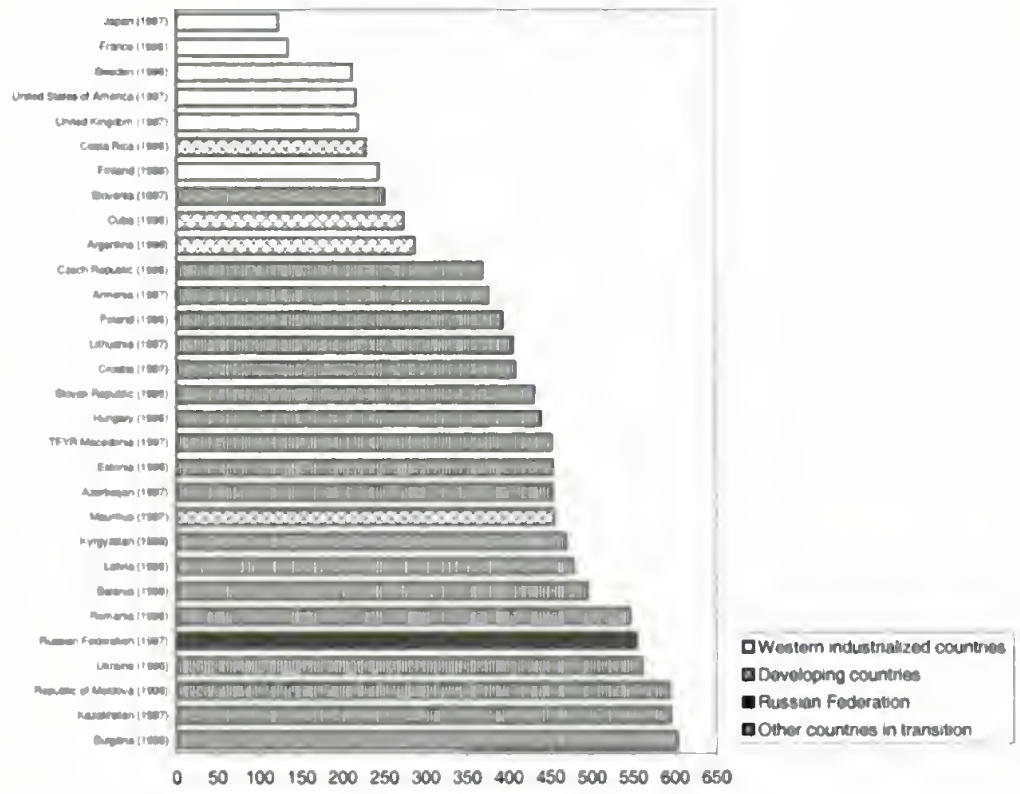
Age-standardized death rates from all causes of death (per 100 000 of the standard population)



Source Author presentation based on data from WHO (1999)

FIGURE 26

Age-standardized death rates for diseases of the circulatory system, including ischemic heart diseases and cerebrovascular diseases (per 100 000 of the standard population)



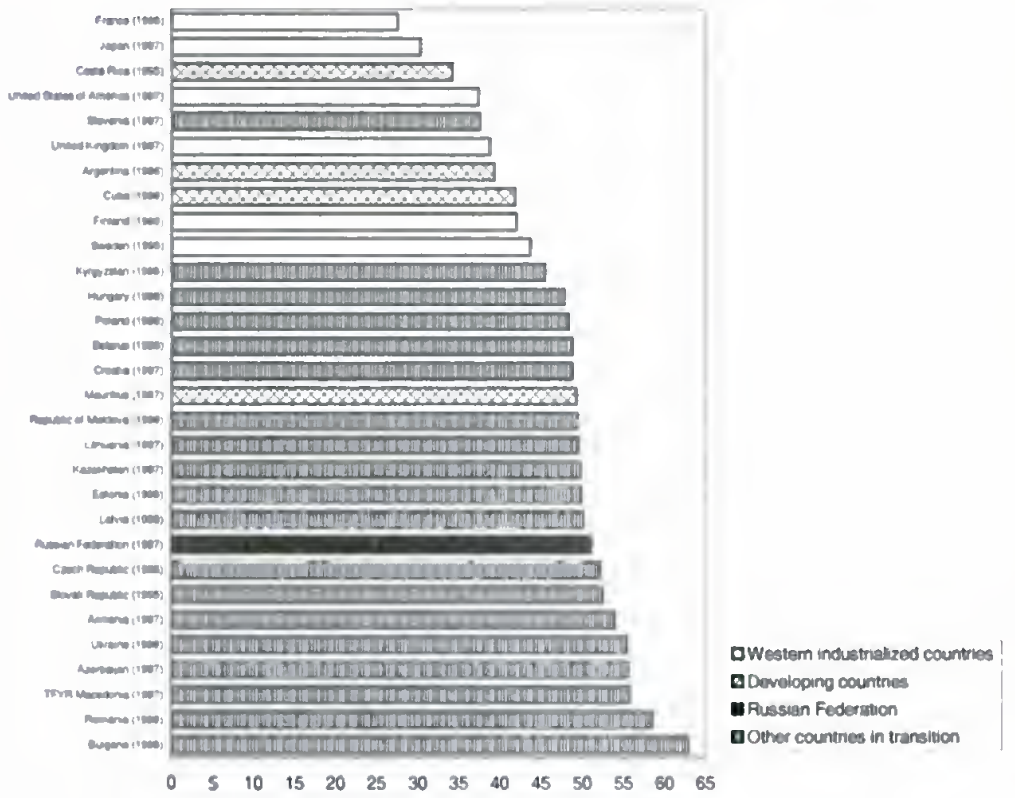
Source: Author presentation based on data from WHO (1999).

mortality from diseases of the circulatory system, which are predominantly cardiovascular diseases (Figure 26). The high contribution of these diseases to overall mortality in countries in transition is evident from Figure 27, which shows the share of diseases of the circulatory system in the SDR from all causes. Furthermore, CVD were the main cause of disability in the Russian Federation in 1997, accounting for 48 percent of all new cases of disability (WHO, 1999).

The Russian population, because of its risky nutritional state – with high rates of overweight and obesity and high prevalence of hypertension among adults – is more likely to die once CVD is diagnosed than the population in most other countries. The dietary habits of the Russian population (as well as lack of exercise and lower levels of medical care) are primary causal factors behind

FIGURE 27

Deaths from diseases of the circulatory system expressed in percentage of deaths from all causes (in age-standardized death rates)



Source: Author presentation based on data from WHO (1999)

these problems. The high rates of overweight and obesity in Russian adults were illustrated in Figure 19. Hypertension is found in 60 percent of men and 34 percent to 51 percent of women (according to the "hard" criteria of blood pressure being ≥ 140/90 mm Hg). Elevated total serum cholesterol levels were diagnosed among 21.3 percent of men and among 17.8 percent of women aged 20–59 years (WHO, 1999). All these risk factors – overweight and obesity, hypertension, high serum cholesterol levels – are partly or mainly determined by dietary intakes. This also holds for widespread polyhypovitaminosis stated earlier, which is likely to aggravate the problem (Table 30). Russian patterns of food consumption, then, are a chief cause of the high prevalence of nutrition-related risk factors.

Dietary intakes

The majority of the most severe nutritional problems in the Russian Federation – overweight and obesity in adults and various micronutrient deficiencies in both adults and children – are linked to the Russian diet. The following section highlights facets of the Russian diet that are responsible for these problems. For children, these are low rates of breastfeeding, deficiencies in weaning practices, apparent overnutrition for years 0 to 7 and undernutrition from 7 to 13, a lack of vitamin C and iron deficiencies. For adults, the most severe problems are caused by a high-fat, low fibre diet. This includes low consumption of fruits and vegetables (a low-fibre diet), high consumption of meat and meat products (with a high fat content) and higher than recommended alcohol (for males) and sugar consumption.

Children

Breastmilk is the optimal food for infants throughout the first six months of life. Breastfeeding ensures optimal growth and development of the baby and protection against infection. However, the prevalence of breastfeeding in the Russian Federation is low in the age group of 0–6 months and has even declined in recent years (Table 31) (WHO 2000a).

Even among infants of up to three months, only around 42 percent were exclusively breastfed in 1999. One of the reasons for low breastfeeding rates is the current practice of infant care management and feeding recommendations. Health professionals working in the sani-eped centres[29] advise the separation of mothers and newborns in maternity clinics. This practice is still widely believed to prevent the transfer of infection from mothers to babies. However, the opposite is true: the separation of mothers and infants is an obstacle to successful breastfeeding, thereby making babies more susceptible to infection. Furthermore, the hygienists of the sani-eped service warn of breastfeeding because breastmilk is supposed to contain high concentrations of PCBs (polychlorinated biphenyls) (WHO, 1998a). Yet the benefits of exclusive breastfeeding in the first half of the first year of life still outweigh possible disadvantages from environmental contamination.

[29] The so-called sani-eped centres deal with environmental issues, hygiene and food safety, and are part of the sanitary epidemiology system under the responsibility of the Ministry of Health (WHO, 1998a).

TABLE 31
Prevalance of breastfeeding

	1995	1996	1997	1998	1999
Up to 3 months	45.1	44.8	43.5	43.4	41.9
Up to 6 months	32.5	32.3	32.3	32.4	27.6

Source: WHO (2000a),

Little information is available on weaning practices and complementary feeding. A survey on food consumption, nutrition and health status was conducted among 4 000 poor families in selected *oblasts* (Volgograd, Voronezh, Samara and Pskov) and the Republic of Komi. These survey findings are neither statistically representative for the total population of the Russian Federation, nor for the group of poor households in all geographical regions. However, if they reflect common practice, they indicate a considerable lack of knowledge of proper weaning practices. Whereas the majority of neonates in the sample population received breastmilk, 14.7 percent of infants that were not breastfed received cow milk as first food instead of adapted formulas (Baturin, 2001). Unmodified, pure cow milk is considered inadequate for children younger than nine months (WHO, 2000). Yet cow milk was offered to more than half of the infants before the age of four months, especially in the lowest income families. In the higher income group among these poor households, porridge was prepared from commercial products tailored to infants' needs, but this was not the case for families with lower incomes, who used ordinary, non-fortified ingredients to make porridge for infant feeding (Baturin, 2001).

Information on infant feeding practices in the Russian Federation (WHO, 2000b) allows conclusions to be made concerning the reasons for the observed disturbing pattern of extremely high rates of stunting among children less than one year of age. Too early introduction of tea, cow milk and solids to a large proportion of infants (displacing breast milk and causing iron deficiencies) and inadequate complementary feeding (too late introduction of meat and liver) are clear causes of stunting. Such practices are responsible for the coexistence of an oversupply of calories with micronutrient deficiencies.

However, RLMS data supports the hypothesis that stunting in the age group of under-fives arises from causes other than deficits in dietary energy consumption, such as micronutrient deficiencies and possibly frequent infection. Detailed data on dietary intakes of preschool and school-age children have been collected for a nationally representative sample in the RLMS rounds

TABLE 32
Intakes of dietary energy, fat, protein and vitamin C among children aged 0–13 years, 1992–93

Group and age	Dietary energy		Fat mean intake	Protein mean intake	Vitamin C	
	mean intake (25%, 75%)	required levels			mean intake (25%, 75%)	recommended levels
	(kcal/capita/day)		(g/capita/day)		(mg/capita/day)	
girls 0–6 years	1366 (1046,1629)	650-1300	56.4	53.8	37 (22, 46)	70
girls 7–13 years	1636 (1303, 1924)	2000-2200	67.8	63.1	48 (26, 63)	70
boys 0–6 years	1407 (1120, 1650)	650-1300	55.1	54.4	37 (19, 47)	70
boys 7–13 years	1738 (1313, 2054)	2000-2200	71.7	67.3	50 (27, 66)	70

Note: Required and recommended intakes are taken from United States Recommended Daily Allowances (NRC, 1989).
Source: Adapted from Tseng *et al.* (1997) (based on RLMS data).

by means of the 24-hour-recall method. Using this information, Tseng *et al.* (1997) calculated dietary energy, fat, protein and Vitamin C intakes for children aged 0–6 and 7–13 years as well as bioavailability of dietary iron (Table 32 and Table 33).

These data suggest that stunting in the age group of under-fives probably does not arise from deficits in dietary energy consumption. Mean dietary energy intakes of children aged 0–6 years are above the upper limit of requirements in 1992–93, and the threshold level of the 75th percentile exceeds this limit considerably, by more than 300 kcal. There is no indication of a lack of protein in the diet of children aged 0–13 years: protein accounts for 16 percent of total calorie consumption and the absolute amounts are well above the recommendations for the different age groups. The fat content of the diet ranges from 36 to 38 percent of dietary energy intake. The recommended amount for children up to two years is 30–40 percent to avoid both a diet too high in fat and too low in energy density. For older children, the figures suggest mean energy intakes below requirements.[30]

[30] Yet it should be remembered that underreporting may play a role in food consumption surveys using the 24h-recall method. In a survey conducted by Martinchik, Baturin and Helsing (1997) among schoolchildren in Moscow by means of this method and anthropometric measurements, consistently low energy intake values were found, but no correspondingly consistent pattern of poor growth.

TABLE 33
Intake of bioavailable iron among children aged 0–13 years, 1992–93

Group and age	Intake of bioavailable iron		Estimated range of iron requirements (mg/capita/day)
	urban	rural	
	(mg/capita/day)		
girls 0–6 years		0.31	0.5–1.5
7–13 years		0.36	1.0–2.8
boys 0–6 years	0.35	0.36	0.5–1.5
7–13 years	0.49	0.49	1.0–2.0

Source: Adapted from Tseng *et al.* (1997) (based on RLMS data).

Existing studies suggest that Russian children suffer from vitamin C and iron deficiencies. Consumption of vitamin C in the Tseng *et al.* (1997) sample was quite low compared to United States recommended levels. If vitamin C intake is compared with German recommendations for child consumption of vitamin C (lower than the United States recommendations and range from 40 mg for infants aged 0–2 months to 70mg for 10–12-year-olds), the picture looks better for preschool children. Yet iron intakes are consistently below the lower boundary of requirements for growth and maintenance if bioavailability is considered[31] (Table 33); this is in line with the findings on iron deficiency anaemia in children presented earlier in this chapter. Iron absorption is higher for heme than for non-heme iron, and the bioavailability of non-heme iron is enhanced in the presence of heme iron from meat or vitamin C, whereas phytate and black tea act as inhibitors. Since tea is consumed with every meal and phytate intakes are high, average bioavailability of total iron is estimated to be only 3–4 percent. This is considerably below the assumed absorption of iron of 10 percent that usually serves as a base for recommendations on desirable dietary intakes of total iron (Tseng *et al.*, 1997).

Surveys of Moscow schoolchildren indicate that Russian schools provide meals low in calcium, riboflavin and vitamin C. Repeated surveys of schoolchildren from 10–15 years of age were conducted in Moscow in the years 1992–95 using the 24-hour-recall method. These studies show that the most frequently eaten food items were bread and other cereal-based foodstuffs, meat and meat products, sugar and confectionery. Fresh fruit and vegetables,

[41] Note that required levels are not the same as recommended levels. Requirements refer to actual physiological needs, recommendations to the amounts of nutrients that should be available with the diet. Recommendations consider the bioavailability of nutrients, i.e. estimated absorption from dietary intakes, as well as a safety margin.

TABLE 34

Food consumption based on Goskomstat household surveys in the Russian Federation, 1980–1999

	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
All households												
Food consumption (kg/capita/year)												
Bread and products	112	105	97	101	104	107	101	102	97	100	116	111
Potatoes	117	108	94	98	107	112	113	112	108	109	117	94
Vegetables and melons	92	91	85	87	78	76	71	83	78	84	87	81
Fruits and berries	35	41	37	35	29	31	30	30	31	33	29	22
Meat and products	70	70	70	65	58	57	58	53	48	55	57	47
Milk and dairy products	390	378	378	348	294	305	305	249	235	234	240	194
Eggs, pieces	286	265	231	229	243	236	210	191	173	178	205	199
Fish and products	17	17	15	14	12	11	9	9	9	13	15	13
Sugar and confectionery	35	33	32	29	26	29	28	27	26	26	28	28
Vegetable oil and other fats			7	6	7	7	6	6	7	8	11	10
Nutritional content (grams/capita/day)												
Protein	86	78	74	72	68	68	66	61	58	62	68	61
Fat	101	101	98	93	87	90	86	77	74	81	90	79
Carbohydrates	405	376	349	347	343	361	346	336	323	330	369	348
Calories (kcal/capita/day)	2 964	2 739	2 590	2 527	2 438	2 550	2 427	2 293	2 200	2 302	2 565	2 352
Percent of kcal from animal products	32.6	34.8	35.9	35.0	32.5	31.0	34.0	31.2	29.9	28.1	26.2	25.9

Sources: Goskomstat (1999b), pp. 167–168; Goskomstat (2001a), pp. 19, 24.

fish, eggs, milk and cheese were rarely consumed. The intakes of calcium and riboflavin were apparently low in comparison to the recommendations, which can be traced back to low consumption of milk and milk products (Martinchik, Baturin and Helsing, 1997).

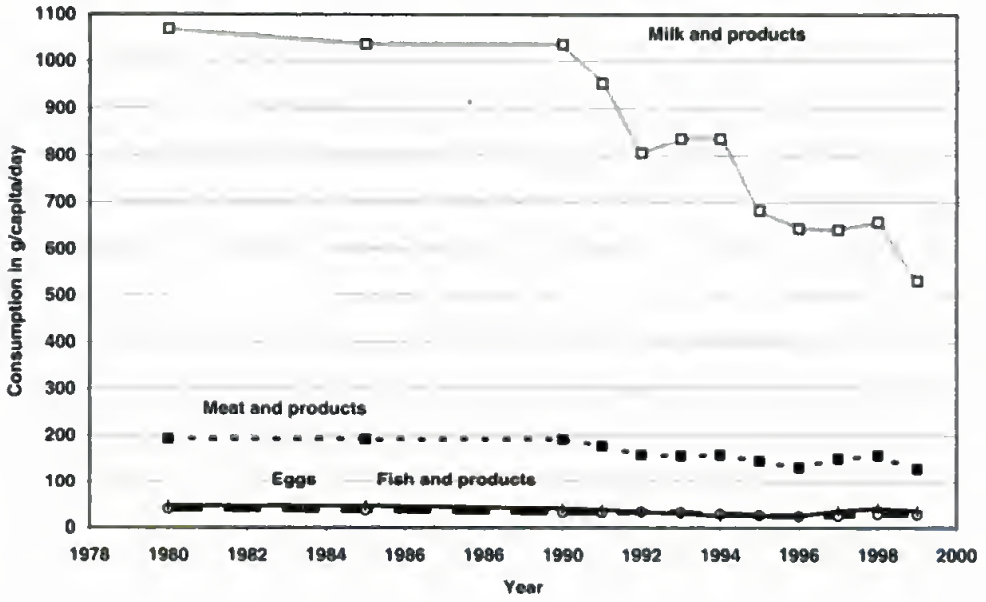
Average dietary intake of the Russian population

For the Russian population as a whole, on average no deficits in calorie and macronutrient consumption during the transition years were found. The average diet of Russians has become healthier since 1990 due to decreases in milk, meat and fat consumption and a rising share of starchy staples like bread and potatoes. But low consumption of vegetables and fruits are responsible for a number of vitamin deficiencies. Moreover, continued high consumption of meat and meat products is responsible for high fat consumption, with resulting cardio-vascular disease problems for the population as a whole.

Table 34 shows official Goskomstat figures on per capita food consumption by food group from household surveys for all households, along with the nutritional equivalents in terms of calories, proteins, fats and carbohydrates. The increasing share of dietary energy from vegetable sources corresponds to commonly-accepted dietary guidelines (WHO, 2000a). Protein intakes are still in the range of recommended levels, both with respect to absolute consumption per capita and day and with reference to their share in total calories. Fat consumption has moved closer to the intakes that are conducive for health, though these numbers are still relatively high. The percentage of dietary energy from fat should not exceed 30 percent (WHO, 2000a).

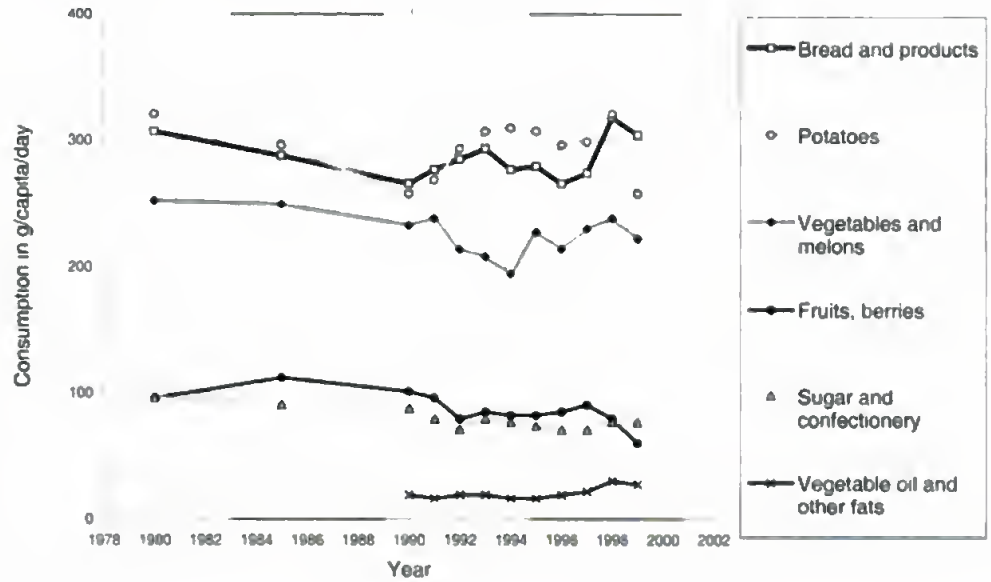
The figures on consumption of meat and meat products (in terms of meat) and milk and dairy products (in terms of milk) per capita illustrate the effects of policy on diets, just as the fall in these two measures illustrates the effects of reforms. Figure 28 and Figure 29 show trends in food consumption between 1980 and 1999. In the pre-reform period, milk and meat were heavily subsidized, so that Russians could afford to consume these foodstuffs in large amounts (Popkin *et al.*, 1997b). The rationale behind this policy was the erroneous belief that large amounts of calories and animal protein were necessary to prevent malnutrition. This erroneous belief was based on grossly overstated requirement estimates (Popkin *et al.*, 1997a). During the reform period, subsidies were reduced, followed by increased prices of animal products. In contrast, the downward trend in bread and potato consumption was reversed in 1990, whereas the intakes of vegetables and fruit, sugar and

FIGURE 28
Changes in animal product consumption in the Russian Federation, 1980–1999



Source Table 34

FIGURE 29
Changes in vegetable product consumption in the Russian Federation, 1980–1999



Source: Table 34

TABLE 35
Actual and recommended average dietary intakes in the Russian Federation, 1990–91, 1998–99[1]

Food category	Actual dietary intakes (g/capita/day)		Food category	Recommended (g/capita/day)
	1990-91	1998-99		
Bread and cereal products	271	311	Bread and cereal products[3]	270–320
Potatoes	263	289	Potatoes[3]	300
Vegetables and fruit	334	300	Vegetables and fruit[4]	400–450
Meat and meat products	185	142	Meat and meat products[5]	65
Milk and milk products, including butter (in milk equivalent)	995	595	Milk and milk products, excluding butter (in milk equivalent)[6]	700–750
Eggs/week (pieces)	4.4	3.9	Eggs/week (pieces)	3
Fish and fish products	40	38	Sea fish	40
Sugar and confectionery	84	77	Sugar[7] (at maximum)	55
Alcohol, adult females[2]	-	5	Alcohol[8], adults (at maximum)	20
Alcohol, adult males[2]	-	30		

[1] Mean of the two years
[2] Based on RLMS data from 2000
[3] Calculated from a recommended intake of ca. 400 g potatoes or 75–90 g rice or pasta and 250–300 g bread
[4] More than 400 g vegetables and fruit according to WHO recommendations
[5] No more than 80 g red meat according to WHO recommendations
[6] Calculated from a recommended intake of 250 g low-fat milk and 60 g cheese
[7] Based on a dietary energy intake of 2 200 kcal/capita/day (no more than 10% of calories should originate from sugar)
[8] WHO recommendation
Source: Author's calculations based on data from Goskomstat (1999b), pp. 167–168; Goskomstat (2001a), pp. 19, 24; Zohoori *et al.* (2001), p. 3; WHO (2000a), pp. 6f, 15; and Pölert and Löhlein (1995), p. 470.

confectionery have continued to fall. Fish and vegetable oil are still among the less preferred foodstuffs.

Table 35, actual intakes of different foodstuffs in 1990–91[32] and 1998–99 and alcohol in 2000 are contrasted with recommended levels. The increased consumption of bread and cereal-based foods and potatoes as well as the decline in meat consumption are positive trends, because their intakes have moved closer to recommended amounts. However, the consumption of meat and meat

[32] Mean value for the two years.

products, which are major sources of saturated fat that increase the risk of cardio-vascular disease (CVD), is still considerably above recommended levels (according to both German and WHO recommendations). As eggs and full-fat milk have relatively large cholesterol contents, falling intakes since 1990 likewise constitute a positive trend, although milk consumption had reached quite a low level by 1998–99.[33]

The decline in the consumption of vegetables and fruit is definitely negative, since their intakes ranged already far below recommended levels in 1990–1991 (WHO, 2000a). This unfavourable trend can be held responsible for widespread vitamin deficiencies. In contrast, the consumption of sugar and alcohol (empty calories, without nutritional value), though it declined since the peak in 1994, is still above recommended maximum levels.[34]

To summarize the evidence on diet: for the population as a whole, nutritional excess seems to be a far greater threat to public health than deficits in dietary energy. Considering the fact that mortality in the poorer developing countries (for which WHO provides no age-standardized death rates) is mostly a matter of infectious and parasitic diseases and not due to non-communicable diseases, the successor states of the former Soviet Union probably hold the international record in mortality from diseases of the circulatory system. They are closely followed by the transition countries in eastern Europe (WHO, 1999). The high share of cardiovascular diseases can be traced back to nutrition-related risk factors like hypertension, obesity and high serum cholesterol levels that are in turn outcomes of excess intakes of dietary energy, saturated fats, cholesterol and alcohol (WHO, 1999). The traditional Russian diet implies high intakes of meat and milk (including their products) and animal fats, which is a legacy of the Soviet era, when those products were heavily subsidized and erroneous recommendations created erroneous beliefs among health professionals and the general public about nutritional needs.

Against this background, many Russians perceive the reduction in meat and milk consumption that followed the economic reforms and cutback of subsidies as impending malnutrition. Yet, from the viewpoint of healthy eating, the decreased consumption of animal products and fat means an improvement of the average Russian diet. Unfortunately, dietary intakes of fresh fruit and

[33] The data in Table 27 are not directly comparable with recommended levels, since the latter do not include butter in milk equivalents.

[34] Note that the figures in Table 30 are not fully comparable, because consumption of sugar and confectionery is contrasted with maximum recommended levels for sugar.

vegetables have fallen even more below recommended levels since 1990, which is a negative trend. Poor knowledge of the principles of healthy eating, unfavourable food preferences and attitudes towards breastfeeding, as well as low levels of physical activity, have been identified as major obstacles to improved nutrition and health in the Russian Federation.

Chapter 5
Improving food security

The previous three chapters have identified three key issues of food security in the Russian Federation. Chapter 2 critically assessed the main indicators of *food availability*. Chapter 3 discussed the evidence on *access to food* by the Russian population. Chapter 4 discussed the *nutritional status and diet* of the Russian population. The present chapter summarizes the policy implications of the preceding analysis.

Although "food security" has been used as a justification for protectionist agricultural policies and support for producers, we found no evidence that such policies improved actual food security in the Russian Federation.

No evidence was found to support the arguments made by some for support to agricultural producers, imposition of import tariffs or quotas on food imports or for government food distribution to outlying areas based on food security concerns. Food availability in terms of calories has remained well above minimum dietary energy levels consistent with a sedentary lifestyle suggested by WHO/FAO/UNU in the Russian Federation during the transition period. Likewise, no evidence was found of excessively high food import dependence for the Russian Federation using either Goskomstat commodity balances or FAO balances. Additionally, no evidence was found that outlying *oblasts* suffered from inadequate food availability, on average, from 1997 to 1999.

These conclusions indicate that there is little evidence to justify protectionist agricultural policies and support for producers on food security grounds. Agricultural policies designed to increase livestock or grain production or to limit food imports may be justified on grounds other than food security. The experience in western industrialized countries suggests that support to agricultural producers, tariffs and quotas tend to increase particularly the income of the large, commercial farms which produce certain commodities. These are not food security concerns and should not be confused with them.

Administrative barriers to trade impact most heavily on low-income households in grain deficit* oblasts, *and thus threaten their food security.

Although no evidence was found that outlying *oblasts* of the Russian Federation suffered from inadequate food availability on average from 1997 to 1999, there is evidence of significant increases in administrative barriers to trade in grain from 1995 to 1998. These barriers were expressed in significant increases in the differences in grain prices between regions. Price differences between grain producing and consuming regions in the country grew each year between 1995 and 1998. By raising prices in grain deficit *oblasts*, administrative barriers to trade have the most severe impact on low-income families, raising their probability of inadequate food intake.

Goskomstat could benefit from joint work with and technical assistance from international organizations and national research institutes in order to improve the household budget survey, particularly in the areas of income representativeness and food composition tables.

Adequate monitoring of food security in a country depends on reliable information on inequalities in food consumption in the population in order to build a comprehensive picture of the adequacy of food access in a country. The lack of robust estimates of the portion of the population with inadequate food consumption in the Russian Federation is a severe lacuna in the literature on Russian food security and socio-economic studies. This problem could be addressed by joint work between Goskomstat and international organizations, such as the World Bank, FAO and WHO, as well as with foreign national research institutions. Some particular problems identified in this study are the sampling methodology of the household budget survey in the Russian Federation in regard to income estimates. A way around this thorny problem is to carry out a separate nationally-representative nutrition study, working with WHO and FAO. Goskomstat would also benefit from working with the WHO and FAO to harmonize food composition coefficients.

Any remaining administrative barriers to the expansion of private plots should be abolished.

The most important safety net of the Russian population against poverty and food insecurity is private garden plots. These plots were found to be significantly more important for poor households in reducing poverty and ensuring adequate food intake than for better-off households. Of course, the abolishment of administrative limitations does not resolve the problem of increasing food supplies for poor families, since expansion of private plots costs money and more work to produce.

Food security cannot be dealt with in isolation from other more general policies for the alleviation of poverty.

One of the core reasons for food insecurity is the low level of per capita income in the Russian Federation. Economic growth in other countries has been shown to benefit both rich and poor. Growth-friendly and investment-friendly policies can thereby have the overall effect of reducing poverty, which is tantamount to reducing food insecurity. These are well-known maxims, but their simple truth bears repeating. The stagnation of the Russian economy due to slow structural reforms in the 1990s is the single most important impediment to food security in the Russian Federation.

Urban areas, as the most food insecure, should be the predominant targets of any food relief policies.

Results from the Association Agro Survey of Food Security show that the risk of food inadequacy is considerably more severe in *oblast* centres than in other urban areas. The risk of food inadequacy is lowest in rural areas. It is appropriate, then, that government or NGO food-related relief policies should emphasize urban areas of the Russian Federation.

A school lunch programme could go a long way towards resolving problems of food inadequacy and malnourishment in lower-income, large families in the Russian Federation.

Results from the Association Agro Survey of Food Security show that larger families and lower income households were at greater risk of food inadequacy. Therefore, food-related relief policies should be targeted with this in mind. An

excellent programme for consideration is a nutritionally balanced, subsidized, school lunch programme. School lunch programmes have many advantages over other means of nutrition support in the population. School lunch programmes target children in public schools, thus excluding children of better-off parents who may send their children to private schools and whose income makes subsidized food unnecessary anyway. School lunch programmes also target assistance to children after weaning. In Chapter 4 it was found that, while the mean caloric intake of Russian children 0–6 years of age seemed to be more than adequate, that of children from 7 to 13 years of age fell short of the daily intake recommended in the United States. School lunch programmes can assist in resolving this problem. Another advantage of school lunch programmes is that they are targeted on a specific, vulnerable group that should have wide appeal in government and private business.

The Russian Federation would benefit from having a system of child nutrition monitoring in public schools.

A school lunch programme is only one part of an overall effort at monitoring child nutrition in public schools, which would be an appropriate way to better target interventions. This study found that overweight and obesity are quite prevalent, particularly in poor families. It was also found that caloric intake of children aged 0–6 was more than necessary. Problems of overnutrition should not be exacerbated by food supplies directed to the wrong recipients. Therefore, a monitoring system for child growth and development in public schools would be a good base for well-targeted interventions. Further research, using this monitoring base, could help to better identify the causes of child malnutrition and shed light on the reasons for the high stunting rate in infants and its association with overweight.

The Russian Government should undertake an educational campaign to promote breastfeeding and nutrition education for mothers and health professionals.

Another appropriately targeted intervention is a public information campaign to raise awareness about the benefits of breastfeeding and proper nutrition of infants and children. Low prevalence of breastfeeding and deficiencies in infant feeding (probably micronutrient deficiencies) may be responsible for

high stunting rate in infants and its association with overweight. Since good nutrition in early life is the basis for health and adequate nutritional status in adulthood, the promotion of breastfeeding while it is being done, i.e. in the course of baby-friendly hospital care, is essential in this respect. The provision of adequate weaning and complementary foods, along with teaching mothers and health professionals about feeding practices, should be part of the strategy to improve infants' and children's nutritional status.

The Russian Government can greatly reduce health risks in the country by promoting healthy diets and a healthy lifestyle, and by educating health professionals, teachers, and children in principles of a healthy diet.

Knowledge of proper nutrition and healthy diets in the Russian Federation has been severely distorted by belief in grossly exaggerated food intake guidelines promoted during the Soviet era (Popkin *et al.*, 1997b). The level of awareness of the principles of healthy eating in the Russian population is quite low (Baturin, 2001). It is therefore necessary to change the understanding not only among the population, but among health professionals as well, of what constitutes a healthy diet. A programme of action for improving nutrition should be based on a consensus and involvement of various partners: the government and regional authorities, the general public and civil society health and education professionals, public health services initiators and coordinators, the food production, processing and trade sector, as well as academic institutions. Important steps have already been taken in the Russian Federation, such as the implementation of the WHO programme CINDI (Countrywide Integrated Non-Communicable Disease Intervention), workshops and regional initiatives to improve health and nutrition (WHO, 2000a).

The Russian Government can reduce micronutrient malnutrition in the country by requiring vitamin fortification of flour and milk and salt iodization and by subsidizing iron supplementation for pregnant women.

Common strategies to address micronutrient deficiencies on the country level are dietary diversification, fortification and supplementation. All three of these should be pursued in the Russian Federation. Fortification of basic foodstuffs like flour with vitamins and minerals is an effective means to address widespread micronutrient deficiencies that has an immediate effect, as it does not require

changes in dietary habits. Fortification of bread is already practised, but only in a few regions and in insufficient amounts to close the gap in micronutrient supply. Vitamin-fortified milk is available, but at high prices. Legislation and incentives to producers are needed to improve this situation (Baturin, 2001). The vitamins of the B group, folic acid and possibly iron are suitable candidates for fortification, given their technological properties and the high prevalence of deficiencies. Iodization of salt is undertaken in the Russian Federation, but production and consumption of iodized salt are still too low to lift iodine supply to recommended levels (WHO, 2000a).

Fortification is an applicable short-term strategy. However, fruit and vegetables, which are rich sources of micronutrients, contain additional ingredients that are beneficial to health, such as various antioxidants (protective factors against CVD and probably some forms of cancer). Therefore, except for salt iodination, fortification is a second-best solution as compared to dietary diversification towards fresh fruit and vegetables, which should be preferably locally grown to prevent losses of micronutrients during storage and transportation. Changes in food preparation should be part of a strategy to increase vitamin supply: dietary intakes of vitamin C from vegetables could be improved if prolonged cooking of cabbage and other vegetables was avoided. Though they would increase the benefits of vegetable consumption, behavioural changes such as these are difficult to achieve in any population. In some regions, climatic conditions are not conducive to the production of fruit and vegetables (Baturin, 2001). Some of these obstacles may be overcome in the long run, and both nutrition education of the general public and of health professionals as well as cooperation with producers and retailers have a role to play in this respect. Fortification of basic foods could largely become superfluous if the consumption of fruit and vegetables increases.

Vitamin supplementation is an appropriate strategy to target pregnant women. This study found evidence of a high prevalence of anaemia among pregnant Russian women. Blood tests during antenatal care and iron and folic acid supplements, if necessary, could help to reduce anaemia as a post-birth complication. Improving the iron status of pregnant women would benefit their newborns, too. Information about appropriate feeding practices of infants would further help to preserve children's iron status. In addition, giving up the habit of drinking black tea at meals would increase the bioavailability of iron: black tea might be replaced by herbal tea, or could be consumed at non-meal times (Tseng *et al.*, 1997). This is also a prerequisite for the effectiveness of iron fortification.

The Russian Government can assist in reducing the risks for the population from overnutrition and cardio-vascular disease.

The most important nutrition and health problem of the Russian population was identified as overweight and obesity, which is connected with the high-fat Russian diet. Successful programmes to reduce overweight and obesity as well as other risk factors of CVD, lowering mortality from cardiovascular diseases, have been carried out in other countries (Pearson and Patel, 1997). Nutrition education is an important step in this process, especially if the erroneous beliefs about nutritional requirements among health professionals and the Russian population are considered (Popkin *et al.*, 1997b). But this is not sufficient if applied in isolation. The food production, processing and trade sector should be involved to make healthier alternatives to traditional foods available at affordable prices, e.g., low-fat meat and milk, fresh fruit and vegetables. The ongoing shift from food from animal sources to food from vegetable sources and the decrease in fat consumption should be supported. Giving butter as food aid to the Russian Federation, where it is dumped at subsidized prices on the market, perpetuates harmful dietary habits instead of improving nutrition.

Since meat and meat products are sources of highly bio-available iron, and iron status is precarious in several risk groups in the Russian Federation, fat meat and meat products should be preferentially replaced by other iron-rich foods such as lean meat, fish, legumes and liver (WHO, 2000a). In order to maintain and eventually increase calcium intakes, a further reduction of milk consumption is not desirable, but substituting full fat by low-fat milk products is advisable. A higher share of fruit and vegetables in the diet would not only be beneficial due to their high content of various micronutrients, but also would reduce the energy density of diets and thus help to maintain body weight within a reasonable range. Sugar consumption should be reduced, but an even more important step to decrease CVD risk and improve public health and life expectancy in the Russian Federation would be the reduction of alcohol consumption, especially among adult males. Since a large proportion of alcohol stems from illicit sources, taxation and bans might have a limited effect. Encouraging physical activity might help to reduce the high prevalence of overweight and obesity and other risk factors of cardiovascular diseases.

Food aid is probably not an appropriate intervention for a country with the Russian Federation's problems of food insecurity.

Food aid packages of bread, meat and dairy products seem to miss the more pressing issues of food insecurity in the Russian Federation. Anthropometric indicators are perhaps the most reliable indicators of undernutrition we have for the Russian population. Monitoring since 1992 indicates that between 1 and 8 percent of children and adults suffer from undernutrition in the Russian Federation. They also indicate that overweight and obesity are problems for over 30 percent of the adult Russian population. Thus, the most pressing food security concern in the Russian Federation is not undernutrition, but overnutrition and malnutrition, which are both results of unhealthy diets.

Several authors (Kramer, 1999; Serova, 2000; GAO, 2000) have analysed the welfare effects of the 1999–2000 food aid to the Russian Federation. They found a number of reasons why food aid may not have been the most appropriate response to the pressing food security concerns of the country. According to these studies, the threat of hunger in 1998 may have been exaggerated. The observed decline in grain production in 1998 was mostly due to a lower harvest of feed grains. Production of food grains in 1998 and 1999 was only slightly below the average food needs, and the quality of that food grain was high (ERS/USDA, 2000). These studies also found that by the time the food aid was received, it was no longer needed. Most of the aid was shipped in the late summer of 1999 when Russian producers started to harvest their new crop. These studies also found that the targeting of food aid was poor. No more than 5 percent of the food supplied under the programme ever made it to the intended recipients (Kramer, 1999).[35] The large proportion of aid was shipped to Moscow and St. Petersburg, the wealthiest and best-supplied areas of the Russian Federation.

The studies also found that food aid actually harmed Russian domestic producers by selling food at below market prices (GAO, 2000). Under the agreements with the EU and the United States Government, the Russian Federation was prohibited from exporting any commodities that were shipped under food aid. Serova *et al.* (2001) reported a significant reduction in Russian export of grains and wheat flour as a result of these restrictions. Last, the studies found that food aid set up deleterious incentives to implement economic reforms

[35] In the AA survey undernourished households received food aid at exactly the same rate as sufficiently nourished households. Twenty-seven percent of both types of households received aid.

in the country. First, the knowledge that food aid could be had at the time of perceived need may lessen the overall incentives to implement economic reforms in agriculture (Kramer, 1999). Food aid fuels corruption, rent-seeking and waste (Kramer, 1999). Local distributors of food aid were not chosen on a competitive basis. Instead, insider-controlled procurement agencies were used (Serova, 2000). Thus, food aid helped preserve the centralized system of food marketing.

The overall record of food aid to the Russian Federation is perhaps mixed at best. Food aid improved food availability and may have helped consumers, but poor targeting and creation of possible distortions to local markets may have limited its positive effects. The food aid effects on producers were likely to be negative due to depressing effects on prices. The unintended effects of food aid were corruption and preservation of centralized system of food marketing due to transparency in choosing the agents that distribute aid in the regions and poor monitoring. Perhaps most importantly, food aid is designed to address a problem – inadequate food consumption – which this study has shown is far from the main problem of food security in the Russian Federation.

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Appendix
Food availability and supply

TABLE A.1
Per capita food availability (kcal/day)

	1992	1993	1994	1995	1996	1997	1998	1999	change 1992–99
Food use	2 935	2 971	2 911	2 903	2 842	2 851	2 855	2 879	-2
Production	7 184	6 743	5 546	4 835	5 020	5 868	3 887	4 307	-40
Exports	31	37	160	169	113	150	165	107	242
Production for domestic use[1]	7 153	6 706	5 386	4 666	4 908	5 718	3 721	4 200	-41
Import	2 187	1 199	597	728	763	905	759	1 146	-48
Net import	2 156	1 163	437	559	650	755	593	1 039	-52
Non-food use	4 712	4 353	3 931	3 712	2 864	3 118	2 428	2 471	-48
Domestic supply[2]	9 340	7 906	5 984	5 394	5 670	6 623	4 480	5 347	-43
% of import in domestic supply	23	15	10	14	13	14	17	21	-8
% of import in production	30	18	11	15	15	15	20	27	-13

[1] (Production-Exports)
[2] (Production + Imports - Exports)
Source: Author calculations based on data from FAOSTAT.

TABLE A.2
Quality indicators of per capita food supply

	1992	1993	1994	1995	1996	1997	1998	1999	change 1992–99
Food use, total (kcal/day)	2 935	2 971	2 911	2 903	2 842	2 851	2 855	2 879	-2
Vegetable products (kcal/day)	2 158	2 199	2 159	2 178	2 140	2 158	2 168	2 225	3
Animal products (kcal/day)	776	772	753	725	702	693	687	654	-16
% animal products	26	26	26	25	25	24	24	23	-14
Protein, total (g/day)	91.7	90.7	89.4	88.5	87.1	88.8	88.5	85.9	-6
Protein, animal (g/day)	46.8	45.9	44.4	43.9	43.7	44.4	44.5	41.8	-11
% animal protein	51.1	50.6	49.7	49.6	50.2	50.0	50.3	48.6	-5
Fat, total (g/day)	82	83	81	81	79	77	76	74	-10
Fat, animal (g/day)	59	58	56	53	50	49	47	45	-24
% animal fat	72.6	70.6	69.9	66.3	63.4	63.2	62.0	60.6	-17

Source: Author calculations based on data from FAOSTAT.

TABLE A.3
Indicators of per capita food supply (kcal/capita/day)

	1992	1993	1994	1995	1996	1997	1998	1999	change 1992–99
Grand total	2 935	2 971	2 911	2 903	2 842	2 851	2 855	2 879	-2
Cereals – excluding beer	1 237	1 225	1 227	1 199	1 162	1 174	1 171	1 180	-5
Potatoes	216	232	223	227	230	239	226	216	0
Sweeteners	326	338	337	348	361	353	369	384	18
Vegetable oils	144	153	144	175	190	180	194	200	39
Vegetables	56	48	45	50	51	56	56	62	11
Fruit – excluding wine	42	40	39	40	45	50	39	35	-17
Alcoholic beverages	128	140	112	110	75	78	89	126	-1
Meat	306	301	290	275	264	255	244	209	-32
Animal fats and butter	197	196	171	152	116	108	93	92	-54
Milk – excluding butter	151	172	199	202	229	230	247	251	66
Eggs	56	53	50	46	44	45	47	47	-16
Fish, seafood	50	35	28	35	37	43	44	44	-13
Other	26	38	47	44	39	41	37	33	31

Source: Author calculations based on data from FAOSTAT.

TABLE A.4
Structure of per capita food supply by commodity (percentage)

	1992	1993	1994	1995	1996	1997	1998	1999	change 1992–99 %
Cereals – excluding beer	42	41	42	41	41	41	41	41	-3
Potatoes	7	8	8	8	8	8	8	8	2
Sweeteners	11	11	12	12	13	12	13	13	20
Vegetable oils	5	5	5	6	7	6	7	7	42
Vegetables	2	2	2	2	2	2	2	2	13
Fruit – excluding wine	1	1	1	1	2	2	1	1	-15
Alcoholic beverages	4	5	4	4	3	3	3	4	1
Meat	10	10	10	9	9	9	9	7	-31
Animal fats and butter	7	7	6	5	4	4	3	3	-53
Milk – excluding butter	5	6	7	7	8	8	9	9	69
Eggs	2	2	2	2	2	2	2	2	-15
Fish, seafood	2	1	1	1	1	2	2	2	-11
Other	1	1	2	2	1	1	1	1	34

Source: Author calculations based on data from FAOSTAT.

Glossary of terms

Anthropometry
Use of human body measurements to obtain information about nutritional status.

Body mass index
A ratio of weight for height often used to estimate body fat. It is obtained by dividing a person's weight (kg) by the square of his/her height (m). BMI is not appropriate for the assessment of growing children, frail and sedentary elderly individuals, or women who are pregnant or breastfeeding.

Degree of food deprivation
A measure of the overall food insecurity situation in a country, based on a classification system that combines prevalence of undernourishment, i.e. the proportion of the total population suffering from a dietary energy deficit, and depth of undernourishment, i.e. the magnitude of the undernourished population's dietary energy deficit.

Dietary energy deficit
The difference between the average daily dietary energy intake of an undernourished population and its average minimum energy requirement.

Dietary energy intake
The energy content of food consumed.

Dietary energy requirement
The amount of dietary energy required by an individual to maintain body functions, health and normal activity.

Dietary energy supply
Food available for human consumption, expressed in kilocalories (kcal) per capita per day. At the country level, it is calculated as the food remaining for human use after the deduction of all non-food consumption (exports, animal feed, industrial use, seed and wastage).

Dollar purchasing power parity

The purchasing power of a country's currency in relation to the US dollar; the number of units of a given currency required to purchase a basket of goods and services valued at US$1 in the United States.

Food inadequacy

Food intake that is continuously insufficient to meet dietary energy requirements.

Food insecurity

A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active, healthy life. It may be caused by the unavailability of food, insufficient purchasing power or the inappropriate distribution or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation and inappropriate care and feeding practices are the major causes of poor nutritional status. Food insecurity may be chronic, seasonal or transitory.

Food security

A situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Gini coefficient

An aggregate numerical measure of income inequality ranging from 0 (perfect equality) to 1 (perfect inequality). The higher the value of the coefficient, the higher the inequality of income distribution; the lower the value, the more equitable the distribution of income.

Kilocalorie (kcal)

A unit of measurement of energy: 1 kcal = 1 000 calories. In the International System of Units (ISU), the universal unit of energy is the joule (J). 1 kcal = 4.184 kilojoules (kJ).

Low birth weight
Newborn infants who weigh less than 2.5 kg at birth.

Macronutrients
Used in this publication to refer to the proteins, carbohydrates and fats that are required by the body in large amounts and that are available to be used for energy. They are measured in grams.

Malnutrition
An abnormal physiological condition caused by deficiencies, excesses or imbalances in energy, protein and/or other nutrients.

Micronutrients
The vitamins, minerals and certain other substances that are required by the body in small amounts. They are measured in milligrams or micrograms.

Minimum dietary energy requirement
In a specified age/sex category, the amount of dietary energy per capita that is considered adequate to meet energy needs for light activity and good health. For an entire population, the minimum energy requirement is the weighted average of the minimum energy requirements of the different age/sex groups in the population. It is expressed in kcal per capita per day.

Nutritional status
The physiological state of an individual that results from the relationship between nutrient intake and requirements and from the body's ability to digest, absorb and use these nutrients.

Overnourishment
Food intake that is continuously in excess of dietary energy requirements.

Overweight and obesity
Body weight that is above normal as a result of an excessive accumulation of fat. It is usually a manifestation of overnourishment. Overweight is defined in this publication as BMI >25–30 and obesity as BMI >30.

Stunting
Low height for age, reflecting a sustained past episode or episodes of undernutrition.

Undernutrition
The result of inadequate food consumption, poor absorption and/or poor biological use of nutrients consumed.

Underweight
Low weight for age in children, and BMI <18.5 in adults, reflecting a current condition resulting from inadequate food intake, past episodes of undernutrition or poor health conditions.

Vulnerability
The presence of factors that place people at risk of becoming food-insecure or malnourished, including factors that affect their ability to cope.

Vulnerable group
A group of people with common characteristics, a high proportion of whom are food-insecure or at risk of becoming food-insecure.

Wasting
Low weight for height, generally the result of weight loss associated with a recent period of starvation or disease.

This report addresses both the situation of food security in the Russian Federation and the outlook for removing constraints on food security in the future. It argues that, despite great concern, the country does not appear to be food insecure by measures of food availability. The most significant change in food availability since 1992 has been a change in the mix of foods, away from products of animal origin towards those of vegetable origin. Survey information on food consumption indicates that food inadequacy seems to be more severe the more urban the settlement. The greater food security of rural areas is connected with the prevalence of private plots and their role as a buffer against poverty. Also, food inadequacy is higher in larger families, though not necessarily in families with large numbers of children. Finally, contrary to popular concern, pensioner families do not seem to be at higher risk of food inadequacy compared to other families. If problems of food availability and food consumption are less severe than has often been portrayed, the most severe food security problems in the Russian Federation – overweight and obesity in adults and micronutrient deficiencies in both adults and children – have been little appreciated until quite recently. In this respect, the average diet of Russians has become healthier since 1990 owing to decreases in milk, meat and fat consumption and rising consumption of staples such as bread and potatoes. However, there is still much to do to promote healthy diets and improve infant feeding practices in the Russian Federation.

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